DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
GEORGE K. BURGESS, DIRECTOR

MISCELLANEOUS PUBLICATIONS—No. 59

Weights and Measures

Seventeenth Annual Conference

OF REPRESENTATIVES FROM VARIOUS STATES
HELD AT THE BUREAU OF STANDARDS
WASHINGTON, D. C., MAY 26, 27, 28, AND 29, 1924

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REPORT OF THE SEVENTEENTH ANNUAL CONFERENCE ON WEIGHTS AND MEASURES OF THE UNITED STATES

HELD AT THE BUREAU OF STANDARDS, WASHINGTON, D. C., MAY 26–29, 1924

FOREWORD

Prior to 1921 the custom prevailed of printing these reports of the Annual Conferences on Weights and Measures verbatim. In that year, however, and also in 1922 and 1923, on account of the urgent need for economy in the expenditure of Government funds it was found essential to abridge somewhat the reports of the Fourteenth, Fifteenth, and Sixteenth Annual Conferences, and this was accordingly done.

In the case of the present report the same urgent necessity impels us to the same course, and, consequently, this report also will be found to be abridged. The same method of accomplishing this has been followed, namely, the material has been studied to determine what portions might be deleted with the least sacrifice of essential matter. The result has been that the proceedings of the first session have largely been abstracted and the discussion in all other sessions has been curtailed when it appeared that this could be done without too great a loss of material of permanent usefulness.

This has resulted, as in the reports of the three preceding conferences, in the reports of State delegates being abstracted, since these are probably not of as general use in this report as discussions bringing out the consensus of opinion on some matter of importance, or resulting in some constructive action on a definite proposal. Especially is this last material of importance, since it often shows the necessity of the action taken and the data upon which the action is based, and, in addition, it will serve as a guide to the proper interpretation of the meaning of the conclusion in case any doubt arises in the mind of the reader as to its exact significance.

The bureau is confident that the report will be found not to have been greatly impaired as to usefulness by the necessary abridgments and deletions made.

GEORGE K. BURGESS,
Director, Bureau of Standards, and
President, Annual Conference on Weights and Measures.

FIRST SESSION (MORNING OF MONDAY, MAY 26, 1924)

The conference was called to order at 10.55 o'clock a. m. by Dr. George K. Burgess, president of the conference and director of the Bureau of Standards.

OPENING ADDRESS BY THE PRESIDENT, DR. GEORGE K. BURGESS

Again we welcome you to the Bureau of Standards, and it is not necessary for me to say how cordially we greet you. I hope you will take the opportunity, especially those of you who have not been here before, to see the laboratories of the Bureau of Standards.

Perhaps the outstanding event of the year from a weights and measures standpoint was the recent decision of the United States Supreme Court in the case of the Nebraska bread law in which you are all so much interested. On its face it is true that this was not a very favorable development since the majority of the court decided that the law was unconstitutional and, in that State at least, new legislation must be procured if the sale of this commodity is to be properly regulated. However, the decision, while adverse, seems not to have affected the vital principle underlying standard-weight loaf regulation. Rather, the decision affirmed this principle and largely concerned itself with various details of the legislation and pointed out within what limits the general principle was to be applied. It thus will serve as a valuable guide in the drafting of bread laws in the future and will enable us to proceed with a greater assurance than we otherwise could have had. Moreover, since the decision concerned itself with the details of the Nebraska law, and since most of these provisions do not occur in the laws of other States which have legislated along these lines, it seems that the decision will not be of far-reaching effect and that we are not by any means required to start over again; but with slight readjustments we can proceed without a retracing of our steps.

Naturally the subject is one of much interest and will occupy a prominent place upon our program. To-morrow morning's session will largely be devoted to the subject of bread, and we hope for constructive suggestions and accomplishments. Such an event as this decision affords an excellent illustration of the tremendous amount of good which the conference can accomplish in obtaining uniformity of action throughout the country. Instead of each jurisdiction having to depend solely upon its own ideas, all the officials interested in this subject have in this organization a clearing house where they can assemble and discuss together their common problem and arrive at a common decision. The result of such a deliberation will almost certainly be better laws, increased enthusiasm, less lost motion, and greater efficiency in accomplishing the desired results than could otherwise be hoped for.

Another matter which is of interest to all of you is the interest which has been manifested in legislative proposals along weights and measures lines, especially in Congress. Among these, bread again takes a prominent place. Congressman Brand, of Ohio, who, as a member of the senate of that State, was instrumental in obtaining the passage of the State bread law, did not lose interest in the subject when he stepped from the State legislature into that of the Federal Government. Before the Congress to which he was elected had convened, Mr. Brand had visited the bureau to request our cooperation in drafting a bread law designed to regulate the interstate commerce in this commodity. You may be very sure that we were extremely glad to assure him that he would have our heartiest support and that we proposed to him a bill designed to protect from unfair outside competition those States which had enacted the standard loaf law. We have been working with Mr. Brand very closely ever since and he has found the data, which many of you collected for him at our request in reference to the weights and prices of loaves in the various jurisdictions, of very great use in the battle which he has been waging.

On account of the legislative situation, and on account of the fact that the Committee on Agriculture has been extremely busy in its efforts to find a solution of the perplexing situation which agriculture throughout the country is facing, it seems very unlikely indeed that a Federal bread weight law will be enacted at this session of Congress. You are not to infer from this that Congress looks with disfavor upon the proposal, however, or that the time spent upon the subject has been wasted. The Committee on Agriculture seemed to be very favorably impressed with the arguments advanced in favor of the project and we have no doubt that they will eventually take favorable action in regard to the bill. Mr. Brand will be with us to-morrow morning to tell you about the matter. I am sure that you will all find him to be a very good weights and measures man and one who can present his facts in a very forceful and interesting way. I think that you will all agree that this number of the program is a very interesting one.

But I would not have you believe that the program will be entirely devoted to the subject of bread. There will be many other features of interest and importance to all of you, and the opportunity will be afforded for a great deal of constructive work. It is proposed again to bring up the subject of specifications and tolerances for fabric-measuring devices adopted tentatively at your last session, and to adopt a final code upon this subject. Vehicle tanks will again receive attention, and it is expected that progress will be made toward the solution of the problems incident to that phase of your work, which is certainly of growing importance. The subject of taximeters will receive attention, and we will have several papers concerning them from officials and manufacturers. The testing of these measuring devices is very properly one of your functions. Many of you already occupy this field, and we expect to see more and more of you assume this work in the near future. A number of other papers of interest will be given by members, including one by the delegate from Porto Rico, whom we are glad to welcome, and several speakers

from industry will also claim your attention. I am also very pleased to be able to advise that Doctor Stratton has promised to be here at least one day. Despite the fact that his work now lies along other lines, Doctor Stratton finds it impossible to let one of these conferences pass by without a visit from him, and we, on our part, would miss him very much were he ever unable to get here. The ceremony by means of which we hope to be able to express to him in some measure how high in our regard we hold him will not be carried through this morning, as listed upon the program, since Doctor Stratton found it more convenient to spend Wednesday with us. Finally we have set apart a time which we hope will prove to be sufficient thoroughly to discuss any questions which you desire to present to the conference for consideration.

I might say one word in relation to the arrangement of sessions at this conference. Last year it was left to the executive committee to decide whether one session per day or two sessions per day was preferable. When the committee was polled on this matter it was found that half were in favor of the one plan and half were in favor of the other. To be fair to both sides it was thought that two 1-session days and two 2-session days would be the proper solution and consequently the program has been arranged accordingly; Monday and Wednesday we will have forenoon and afternoon sessions, Tuesday and Thursday forenoon sessions only.

There will be no manufacturers' exhibit of weighing and measuring devices at this conference. For several years this exhibit has been growing smaller until last year there was criticism from both manufacturers and delegates that it was not an entirely successful feature. A preliminary survey did not indicate that it would be very much more successful this year, so it was decided temporarily to discontinue it. This subject has been placed on the program for discussion at this conference to decide our future policy.

During the year I have appointed an official with whom you are all very well acquainted, William B. McGrady, of Pennsylvania, to serve on the committee on specifications and tolerances to fill the place resigned by Mr. White, of New York. Mr. McGrady has been in weights and measures work for many years, and has had very excellent experience both in the field and as an administrative officer; he is thoroughly familiar with commercial apparatus, and through his work in enforcing the serialization law of Pennsylvania is very well versed in specifications and tolerances. I am sure that he will add a great deal of strength to this important committee.

We also, as you see from the program, had expected to have the Secretary of Commerce, Mr. Hoover, with us this afternoon. Mr. Hoover is confined to the house with a bad cold, having suffered from it for the last four days, but it is possible he may be able to appear before the sessions are over. I know he looks forward with the very greatest and keenest interest to the meetings of this conference. As you know, he has met with you during every conference since he has been Secretary, and I sincerely trust his health will permit him to come again.

The next number on the program will be reports by State delegates. This number is one which is always included, since we find

that these reports are of very great assistance in advising those in attendance of the general situation in regard to weights and measures existing throughout the United States—to give them a bird's-eye view of the general progress made. With this information at hand we are then in a better position to proceed with the general program.

The points which we are especially desirous of bringing out are: New legislation enacted during the year, and the general legislative situation in your State; new rules and regulations promulgated and the necessity therefor; the general condition of commercial weights and measures at present existing, with attention to any special types when special conditions exist; the result of special surveys and investigations conducted; and other matters of general interest.

Before proceeding to that item, however, I will call your attention to the fact that the record of the proceedings of the last conference, the sixteenth annual conference, has appeared only during the past month. The delay is chargeable about half to the Bureau of Standards and about half to the Printing Office. We will make special efforts to get the report of this conference out. I do not like to set an exact time, but I am safe in saying we can get it out within six months, including the time at the Printing Office. We have made provisions for speeding up the work in the bureau in getting out the report.

ABSTRACTS OF REPORTS OF STATE DELEGATES[1]

CONNECTICUT

By Thomas F. Egan, *Deputy State Superintendent of Weights and Measures*

Mr. Egan reported that on the whole the work of his department was progressing in a fairly satisfactory manner, but he commented unfavorably on the bread situation, saying that the Connecticut bread law had done little to improve conditions. He stated that bread was being sold in at least 100 different-sized loaves at a wide range of prices per pound. He mentioned that particular attention had been paid during the past year to checking the weights of coal deliveries.

DISTRICT OF COLUMBIA

By George M. Roberts, *Superintendent of Weights, Measures, and Markets*

Mr. Roberts stated that his inspectional force and equipment were somewhat inadequate, and outlined the principal needs of his department in these respects. He stated, however, that by diligent work his department had been able to take reasonably good care of the situation. He stated that special attention had been given to the milk-bottle situation, since there seemed to be a tendency to take advantage of the tolerances in deficiency, and that the tolerances were being strictly enforced, with the result that a very large number of milk bottles deficient in capacity had been confiscated and destroyed.

[1] For convenience of reference these reports have been arranged in alphabetical order throughout.

ILLINOIS

By Fred Benjamin, *State Superintendent of Standards*

Mr. Benjamin reported gratifying progress in his department, especially mentioning the improvement in the gasoline-measuring devices throughout the State, and the greater cooperation between the owners of such equipment and the department. In furtherance of a general campaign of education a number of publications have been issued during the year, and these were briefly described. He also stated that the supply of office and field testing equipment was now complete.

INDIANA

By I. L. Miller, *State Commissioner of Weights and Measures*

Mr. Miller reported the enactment by the last legislature of a standard fruit and vegetable container law, from the operation of which good results are anticipated. He mentioned an extensive series of tests on gasoline-measuring devices, about 20 per cent of which were found inaccurate, the errors being in most cases in deficiency. Mr. Miller spoke enthusiastically of the cooperation being given his department by the various State associations of business men, and mentioned the strong sentiment among these organizations for the abolition of bushel weights and the mandatory sale of dry commodities by weight.

LOUISIANA

By J. N. Siren, Sr., *City Inspector of Weights and Measures, New Orleans*

Mr. Siren reported that the weights and measures supervision in his State was entirely inadequate properly to protect the purchasing public. He mentioned particularly the difficulties encountered with short-weight or short-measure package goods shipped into Louisiana from other States, and stated his opinion that only by action on the part of the Federal Congress could this situation be completely corrected.

MICHIGAN

By L. P. Strong, *Chief, State Division of Weights and Measures*

Mr. Strong reported a general improvement in the accuracy of the gasoline-measuring devices throughout the State as a result of frequent inspection by the officials, and the installation by the owners of better types of equipment. He also commented upon a new device developed by his department for the handling of 50-pound weights in the course of the tests on heavy-capacity scales. He said that this equipment was relatively inexpensive and that it had proved to be very satisfactory in use.

NEW JERSEY

By J. Harry Foley, *State Superintendent of Weights and Measures*

Mr. Foley reported the enactment, by the last legislature, of three weights and measures statutes, one a sales-by-weight law, another

a climax-basket law, and the third a thread law. He spoke of the satisfactory operation of the New Jersey public weighmaster act under the provisions of which 827 certified public weighers have already been appointed. He also mentioned a number of investigations conducted by his department during the year.

NEW YORK

By Barnett Kanzer, *Assistant Director, State Bureau of Weights and Measures*

Mr. Kanzer reported the recent enactment of two new laws, one in relation to bread and the other in relation to gasoline. He described the follow-up system used by his department in all cases where inspections reveal defective equipment; reinspections are made shortly after the original visits to see that all instructions have been carried out. He also described the manner in which the work of the city and county sealers of the State is checked up from their reports to the State department. He stated that a booklet of instructions for the guidance of sealers was issued during the year.

OHIO

By Arthur McWilliams, *Chief, State Division of Dairies and Foods*

Mr. McWilliams reported normal operation of his department, with no new legislation during the past year. He described the results of a survey made to determine the accuracy with which the cream-test scales throughout the State were being used by the operators; results from all sections showed variations approximating 3 per cent, and in many cases it was indicated that operators inspired by mercenary motives made these errors deliberately. It was also stated that the department had recently been giving considerable attention to the testing of grain scales.

PENNSYLVANIA

By William B. McGrady, *Chief, State Bureau of Standards*

Mr. McGrady reported several changes made by the last legislature in the Pennsylvania weights and measures laws, and said that on the whole the work of his bureau is progressing in a satisfactory manner. He spoke enthusiastically of the hearty and efficient cooperation with his bureau of the city and county inspectors throughout the State, especially in connection with a number of state-wide surveys made during the past year.

PORTO RICO

By E. J. Saldaña, *Executive Secretary, Government of Porto Rico*

Mr. Saldaña commented upon the conditions which prevailed in Porto Rico before the passage, in 1914, of the present comprehensive weights and measures law. He stated that at that time the exploitation of the purchasing public by the merchants was universal and

that all sorts of fraudulent practices flourished in the absence of any official inspection worthy of the name. He said that now, however, all this was changed, and that efficient supervision prevails throughout the island.

SOUTH CAROLINA

By A. H. Gibert, Jr., *Chief State Inspector of Weights and Measures*

Mr. Gibert stated that during the past year new records had been established for his department in the number of mechanical tests and supervisional visits made. He said that through the employment of automobiles for his inspectors it was now possible to visit the many country stores in his State several times a year, whereas before it had been impracticable to visit them at all. He also commented upon the successful operation of the weights and measures law recently enacted in South Carolina, particularly the section relating to net weight.

VIRGINIA

By Lawrence Paul, *Chief, Bureau of Weights and Measures, Richmond*

Mr. Paul reported the enactment by the last legislature of a comprehensive State weights and measures law based upon the model law adopted by the annual conference. Under this law weights and measures regulation is placed under the control of the dairy and food department and the law takes effect on June 17. He also reported the passage of a law in relation to the quality of gasoline, which in some cases will be enforced by the weights and measures officials, and described the steps which had been taken along this line in the city of Richmond.

WEST VIRGINIA

By P. R. Edler, *State Inspector of Weights and Measures*

Mr. Edler reported that much had been accomplished by his department notwithstanding the failure of the last legislature to broaden the powers of the State department as had been recommended. He stated that this measure, as well as certain other proposals, would be brought again before the legislature in 1925, at which time it was anticipated that favorable action would be taken. He mentioned that the testing of loaded vehicles on the highways would soon be undertaken.

WISCONSIN

By J. Q. Emery, *State Superintendent of Weights and Measures*

Mr. Emery briefly outlined the State and city weights and measures organization of Wisconsin, and stated that a general compliance with existing law was being secured. Additional motor equipment has been provided for the State department and now each of the State inspectors has a machine. Mr. Emery said that the new bread law was now receiving the support of all of the bakers, even those

who previously had bitterly opposed its passage. He also said that it had been found necessary to proceed against one milk-bottle manufacturer on account of the sale within the State of short-measure bottles.

ABSTRACTS OF REPORTS OF REPRESENTATIVES OF STATE ASSOCIATIONS OF WEIGHTS AND MEASURES OFFICIALS

MASSACHUSETTS ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By Thomas J. McColgan, *Sealer of Weights and Measures, Woburn*

Mr. McColgan stated that his association met annually, alternate meetings being held in Boston, and that these meetings served to coordinate the activities of the sealers throughout the State. He also commented upon the assistance derived by the city officials from the visits of the State inspectors who, under the system prevailing in Massachusetts, make periodic inspections of the work of the local officers.

MICHIGAN ASSOCIATION OF STATE, COUNTY, AND CITY WEIGHTS AND MEASURES OFFICIALS

By Murray R. Stover, *Sealer of Weights and Measures, Port Huron*

Mr. Stover mentioned the excellent spirit of cooperation which prevails among all of the weights and measures officials of his State, which spirit is fostered by the annual meetings of the association. He stated that at all times the State inspectors and city inspectors in those cities having strong departments stood ready to assist new officials appointed, and thus general efficiency was greatly increased. He also described how the need for proper weights and measures laws was impressed upon the members of the legislature of the State.

NEW YORK ASSOCIATION OF SEALERS OF WEIGHTS AND MEASURES

By Charles H. Bulson, *County Sealer of Weights and Measures, Jefferson County*

Mr. Bulson spoke of the beneficial results to all concerned derived from the yearly conferences held by his association. He referred to these meetings as "schools of instruction" and commented briefly on the character of the programs, which are arranged in such a manner that matters of vital interest are brought before the meetings, the consensus of opinion developed, and uniformity of action throughout the State obtained. He also mentioned the problem of the weights on baled hay and what is being done in his vicinity to meet it.

WISCONSIN WEIGHTS AND MEASURES ASSOCIATION

By D. E. Fitzgerald, *Sealer of Weights and Measures, Racine*

Mr. Fitzgerald supplemented the State report by a brief discussion of a new law on the sale of wood recently enacted in Wisconsin. He stated that this law had placed the sale of wood upon a standard

basis and that it was being complied with satisfactorily throughout the State. As a result sales of indefinite quantities had been eliminated, and the purchasers of wood were now assured of definite full measure in the purchase of this commodity.

(Following these reports representatives from a number of cities and counties presented brief reports upon various phases of the work in their jurisdictions.)

(At this point, at 12.50 o'clock p. m., the conference took a recess until 2.10 o'clock p. m.)

SECOND SESSION (AFTERNOON OF MONDAY, MAY 26, 1924)

The conference reassembled at 2.10 o'clock p. m., Dr. George K. Burgess, president, in the chair.

APPOINTMENT OF COMMITTEES

The CHAIRMAN. It is customary at this time to appoint two committees, one on resolutions and one on nominations. On the committee on resolutions the chair appoints:

A. W. Schwartz, of New Jersey, chairman,
I. L. Miller, of Indiana,
A. H. Gibert, jr., of South Carolina,
W. A. Payne, of Monroe County, N. Y.,
H. R. Estes, of Flint, Mich.

On the committee on nominations:

W. F. Cluett, of Chicago, Ill., chairman,
L. P. Strong, of Michigan,
T. F. Egan, of Connecticut,
W. B. McGrady, of Pennsylvania,
Wm. Foster, of Springfield, Mass.

MAINTENANCE OF ACCURACY OF SCALES IN CREAMERIES

By J. Q. EMERY, *Superintendent of Weights and Measures, State of Wisconsin*

I have ventured to extend the scope of the theme assigned me to embrace the allied subjects of cheese factories and cream and milk buying establishments. I shall treat the subject from the standpoint of concrete experience rather than from the mere speculative or theoretic point of view. This is compatible with the law of cause and effect, that before a remedy can be intelligently applied the cause of the defective condition must be ascertained.

The importance of the subject becomes apparent as the extent of possible gains or losses is developed. In discussing the subject from a concrete standpoint, I must necessarily confine myself to the State of Wisconsin. It may be observed, however, that the conditions existing before any regulatory means were employed to obtain accuracy were, probably, about the same as existed in the other dairy States, and that the means there successfully employed to accomplish the end sought are likely to be applicable elsewhere.

The necessary degree of accuracy is taken care of very satisfactorily by the tolerances adopted by this conference, and which have been in effect in Wisconsin since 1914. The particular measures necessary to adopt in obtaining accuracy depend, a great deal, upon the condition of the apparatus at the incipiency of inspectional service.

There are in use in Wisconsin creameries, cheese factories, condenseries, and milk and cream buying stations approximately 10,000 scales, valued at more than $350,000. These 10,000 scales may for their consideration be divided into four general groups, as follows: About 4,200 used exclusively for weighing milk or cream purchased; about 3,410 used for weighing the butter and cheese before shipment or sale; about 1,415 used for cream and milk testing; about 975 used for the testing of moisture in butter and cheese, 675 being used for butter and 300 for cheese.

Upwards of four billion pounds of milk and cream, valued at ninety millions of dollars, are weighed annually over the 4,200 scales first mentioned, or an average of 952,380 pounds, having a value of $21,430, for each scale. If a discrepancy of 1 per cent, or 1 pound on 100, occur in any of these scales, it means a loss or gain of $214.26 to the operator of each scale so in error.

A general notion of the work of the 3,410 counter scales can be gained from the following statements: In 1923 Wisconsin produced approximately 300,000,000 pounds of cheese, valued at $60,000,000, to transport which 12,500 freight cars would be required, making 250 trains of 50 cars each, or 98 miles of trains. If all of this cheese were made into the type of cheese known as Long Horns and placed end to end, it would make 24 rows of cheese 180 miles long, or a belt 12 feet wide made of cheese 6 inches in diameter. This amount of cheese put into a solid mass would cover a space 300 feet square, or 90,000 square feet, to a height of 590 feet. The necessity for accuracy of scales required to do such a vast amount of this kind of work need scarcely be dwelt upon.

The correct percentage of the moisture content of 138,693,322 pounds or more of butter is determined annually by the careful weighings of 10-gram samples on the 675 moisture scales in use in the butter factories. An error of one-half of 1 per cent in these scales might cause a loss or a fine to the operator, as this error means a discrepancy of $285,000, or $422 for each scale. If an error sufficient to cause a reading of 1 per cent less than correct were in the 1,415 scales used for cream testing, the loss to sellers would be $1,990,249, or $1,406 for each scale. As the cream-test scales are the most important from a monetary standpoint, they are given fuller discussion than some of the other scales.

There was a time when an 18 cubic centimeter cream pipette was considered sufficiently accurate to use in making cream determinations, but when it became known that such a pipette would deliver 17.9 grams of a 10 per cent cream and only 15.8 grams of a 50 per cent cream, the cream pipette was replaced by various types of cream-test scales. The wide range in the specific gravity of cream showed the unreliability of the use of a pipette. Every intelligent creamery man is now aware of this. But it is not so generally known that errors approximately as great as those obtained through the use of the cream pipette may be obtained by the use of inaccurate and insensitive cream-test scales.

The better class of books on the testing of cream give minute explanations to the operator concerning various ways in which mistakes or errors in the reading of the fat content of the cream are made, the proper temperature at which to take readings, the proper method of reading the meniscus, the strength of the acid to be used,

and the number of revolutions to be made by the centrifuge. These and other essential details are described, but little or nothing has ever been published with regard to the errors that arise through the use of inaccurate cream-test scales, and, consequently, of the means of correcting them.

Investigations show that many of the mistakes made in creameries in determining the fat content of cream are due, not simply to the causes enumerated in the paragraph above but to the use of scales of improper construction. Frequently creamerymen find themselves unable to duplicate tests in the determination of the per cent of butter fat in cream. Frequently farmers send their cream to the State dairy and food commission, to the university, or to the county training schools for analysis, and the results obtained differ from the readings given at the factory. In some instances, this difference has been found to be due to the use of cream-test scales that were not sufficiently sensitive.

For the purpose of determining what types of cream-test scales were the most accurate and the best adapted to weighing an 18-gram sample of cream, State inspectors of weights and measures were sent to various creameries of the State to inspect the scales in use and to check up the weights obtained upon such scales by the creamerymen. The buttermaker at the creamery was asked to weigh a given number of samples of cream on his scale, following the methods pursued by him in his daily work at the factory. In practically every instance, greater than usual care was taken in making the weighings. The bottles containing the samples of cream were then securely corked and brought to the office of the State department of weights and measures at Madison, where they were reweighed on a delicate Becker office balance sensitive to 0.1 milligram. The results were so surprising that a table was prepared and published in a bulletin issued in 1914. This table revealed the fact that the more sensitive the scale the smaller the error resulting in weighing the cream. In one instance the error or variation in duplicate tests amounted to 3.5 per cent. In another test the variation was only 0.31 per cent. The first scale had a sensitiveness of 9 grains whereas the latter was sensitive to one-third of a grain. In another set of tests 9-gram samples were weighed instead of 18-gram samples, and the variation was 9.64 per cent. It is clear from this that the smaller the charge the greater will be the percentage of error accruing through the use of a sluggish scale. If a 9-gram sample had been taken in the first tests mentioned, the variation in duplicate tests would undoubtedly have been about 7 per cent. Innumerable cases were found where scales were in daily use for weighing samples of cream that had a sensibility reciprocal of from 3 to 10 grains. Few scales were found with a sensibility reciprocal of 1 grain as provided for in our present tolerances and specifications.

Cream-test and moisture-test scales were found in use where the vibrations due to the movement of the machinery were excessive; in one instance the test scale was placed on top of the centrifuge by the operator and samples weighed while the centrifuge was in motion. In some cases the scales were left exposed in a damp room and were covered with rust; in other cases dirt and dust had accumulated on the bearings. Little regard had been given to the placing of the

scales upon a level surface, and while weighing was being done the scales were often exposed to currents of air.

The first systematic inspections that were made showed that 70 per cent of all the cream-test scales were extremely faulty, and of those that were fairly accurate only a few were used properly. The first field inspections showed that a very large percentage of the scales used for weighing the milk and cream purchased were faulty; rusty, worn bearings, broken pivots, home-made loops and weights were in evidence in a great many factories; scales were improperly placed and improperly used; and frequently scales were made to do service as trucks. Oftentimes, the scales were placed on a slant so that the milk or cream would drain out of the weigh can, and nails were commonly used for balancing. In a few cases salt had been placed in the bearings to keep them from freezing together during the cold weather. Counter scales were found in much the same condition as the intake scales. This is only a glimpse of the many causes of the defective conditions found, but having found these causes, we were prepared to apply the remedy. In other words, accuracy must be secured before it can be maintained. Therefore, the first condition to be sought for the maintenance of accuracy of scales in creameries is to get good scales into the factories. You must catch the hare before you can cook it.

Not all of the manufacturers were making cream-test and moisture-test scales that would comply with the tolerances and specifications issued; consequently, changes had to be made by them. In order that correct types of cream-test and moisture-test scales would reach the factories, manufacturers were requested to send all of these types of scales to the office at Madison for test. If they were found nonstandard, they were returned to the seller at once. This rather drastic measure soon had the effect desired and the cooperation of the manufacturers was secured.

This plan was not feasible with regard to the larger scales, however, and it did not afford opportunity for supervisional work in the places where the scales were used; and this supervisional work was absolutely necessary to maintain accuracy. A large percentage of the factories are located in the country away from the railroad, and it was impossible for the regular weights and measures men to visit these factories often enough to properly supervise the use of the scales; fortunately, Wisconsin had creamery and cheese factory inspectors making these establishments, and the experiment (which proved successful) of having these inspectors test and supervise the use of the scales, was put into effect. At the present time the creamery and cheese factory inspectors test all scales in country factories, and the regular weights and measures inspectors do the testing in railroad towns. With this system in effect the percentage of incorrect scales was reduced from 70 to less than 11 per cent in two years; at the present time it is only about 5 per cent. In other words, there has been a reduction of approximately 93 per cent in the percentage of inaccurate scales.

There are many factors necessary to maintain accuracy in scales in creameries and allied establishments, and I shall attempt to enumerate only the ones which, in my opinion, are the most essential.

As before stated, the first requisite is a good scale suited to the use for which it is intended. Next in importance is frequent inspection and supervision by competent inspectors; the supervision necessitates considerable knowledge of the dairy business by the inspector.

An effective method of dealing with owners of scales is to touch their pocketbooks, and inspectors can demonstrate to owners of scales in creameries the effect of rust upon such scales; they can easily show that the life of a scale will be at least doubled by proper care and preventing of rust. A $350,000 investment certainly warrants attention and care. Suggestions have already been made as to placing of scales on level surfaces and to the necessity of keeping them clean. In most factories steam is used, and with a minimum of expense a steam hose can be used thoroughly to steam the intake and counter scales after cleaning, so that they will quickly dry, thus preventing rust. The smaller scales if placed in a fairly dry room and the bearings wiped with an oil-saturated cloth will not rust.

Scales are condemned by the inspectors just as soon as the sensibility limit has been reached, and the owners are left a blank to be filled out, showing the disposition made of such condemned apparatus. Such blank is sent to the weights and measures office and the office in turn refers the matter to the inspector in the territory, who then makes a reinspection. The owners soon realize, by experience, that time spent in properly attending to their scales is most profitable. Beyond successful controversy, the one predominating factor in the maintenance of accuracy of scales in creameries is frequent, competent inspection and supervision.

Eternal vigilance is the price not only of liberty but of accuracy of scales in creameries as well as elsewhere.

DISCUSSION OF ABOVE PAPER

The Chairman. Mr. Emery has given us an interesting account of the increase in accuracy of creamery scales. Does any one wish to discuss Mr. Emery's paper or ask him any questions?

Mr. Siren. I would like to ask Mr. Emery a question in regard to butter—whether it is short weight in Wisconsin as it is in Louisiana? As an average, I never have found it overweight; it is always underweight.

Mr. Emery. If we find it short weight in Wisconsin we prosecute.

Mr. Siren. I have weighed considerable butter shipped into Louisiana and sold in pound prints, quartered, and I always find it short weight, sometimes as much as one-half ounce to the quarter, which would make it 2 ounces short to the pound. They tell me that butter in prints is never weighed, but that it is cut like cheese.

Mr. Emery. Some years ago in Wisconsin they had the practice of selling butter in "called pounds," but that has not been the practice since the weights and measures law has been in operation. In regard to the application of the law to the fact that the butter is shipped into Mr. Siren's State, I will say that so long as any transaction takes place in Wisconsin it is in my jurisdiction, and, as I have said, I prosecute wherever there is a violation of our laws. When it comes to Louisiana it is in the jurisdiction of Louisiana.

Mr. Bulson. We had the same situation in our county in New York, but a remedy was applied which is working out very nicely. Some years ago we found butter short weight, and when the dealers found it would not comply with the New York State law they sent it back to the manufacturers. We have several creameries in our county, and once a month we check up on each creamery, not only in my county but in adjoining counties, and in the past year I have never found any short butter to amount to anything; it is all within the tolerances. There have sometimes been cases where manufacturers got in trouble because of the manner in which the butter was produced, especially in relation to the salting operation. I am not an expert butter maker. However, I watched the manufacture of butter in two different creameries and noted the results. In one case the butter was taken from the churn and at once washed, salted, and printed. I personally took 48 prints of it, weighed them and put them in a locker and locked them up. After about 10 hours I took the butter out and reweighed it and it had lost 1½ ounces to the brick. In another creamery this method was followed: The butter was churned in the morning about 9 o'clock and was salted and left in the churn until 3 o'clock in the afternoon, when it was taken out, printed, and prepared for the market. I weighed some prints of this product and then locked them up for a period of 24 hours. This butter did not shrink appreciably in 24 hours. I think that the salt unites with the water in the butter and some drains off in a brine, and that by allowing the butter to lay for a short time when worked this loss occurs before the printing. All butter makers who follow the latter practice get away from trouble due to shrinkage. However, there are some creameries who hire the man who can get the most butter out of the cream.

Mr. Siren. The butter apparently is never weighed, but is cut. The cutters are all right if the butter is firm and if no airholes are in it. I have also found butter in tubs which weighed 2 or 3 pounds less than marked.

Mr. McGrady. Mr. Chairman, in Pennsylvania we do not care where the butter comes from, whether from Wisconsin or New York or anywhere else. If we find a man consistently selling short-weight butter, we tell him that the mayor desires to see him in the morning.

Mr. Egan. Mr. Chairman, I believe the remedy indicated by Mr. Emery is the right remedy in this matter of short-weight butter. Some years ago after we had about 10 or 12 prosecutions around in different towns for short-weight butter, I had a conference with the storage man handling it and he returned 6,900 pounds of butter to Illinois. All of it was about 1 ounce a pound short, and we have not had any trouble since from short-weight butter from Illinois or any other State. I think prosecutions will put an end to that kind of thing. I think that could be done anywhere.

Mr. Siren. I do not think you should prosecute; I think you ought to confiscate the goods. I believe it is wrong to convict the local man who sells it, since he is not primarily responsible.

Mr. Lock. I am in the same predicament as our friend from Louisiana. I have in mind some short-weight butter which came

from Canada. I notified the Federal authorities and they immediately sent over and seized the butter.

Mr. EMERY. In regard to the responsibility of the seller, in reference to short weight, the courts have held that the protection of the public is so necessary and so important as to warrant the holding of the seller responsible for knowing what he is selling. For my own part I must differ from my friend from Louisiana. If I understand the law, it is the function of the legislature to declare what the law shall be. When a law is placed upon the law books by the law-making body of the State then I as an officer am required to enforce the law. It is not an optional matter for me.

Mr. MILLER. Mr. Chairman, we already have Federal machinery to handle the situation. If the officials in Louisiana will refer the case to the United States Bureau of Chemistry of the Department of Agriculture, they will make a case, because the law is that any food in package form that is short of weight is in violation of the United States food and drugs law.

THE ADMINISTRATION OF WEIGHTS AND MEASURES IN PORTO RICO

By E. J. SALDAÑA, *Executive Secretary, Government of Porto Rico*

Ten years ago F. S. Holbrook informed the Ninth Annual Conference on Weights and Measures that he had just returned from a several months' stay in Porto Rico where he had organized a bureau of weights and measures. The Porto Rican Legislature had just passed a new weights and measures law, and herein, I think, we possess an advantage over most of the States of the Union. Our laws cover the whole weights and measures field and the executive secretary of Porto Rico, which position I am now holding, has regulatory powers; that is to say, has authority to issue rules and regulations which have the effect of laws; and by means of these rules and regulations such deficiencies in the law as may be observed are covered.

Prior to the enactment of the statute referred to, although we had a weights and measures law on our books, no organization to enforce it had been provided for, and it was therefore useless, and we had reached a stage in which stores flourished posters advising the public that they were using pounds of 400 grams (14 ounces), although they were buying their provisions in the States on the basis of the usual pound of 16 ounces. Canned goods were purposely ordered with the containers partially filled, so that we had, for example, size No. 25, which meant 25-pound cans, containing only 18½ pounds. To enforce the law above mentioned Mr. Holbrook helped me organize the bureau.

It may be of interest to the members of the convention to compare the first year's work of 1914 with last year's report. I was then the chief of the bureau of weights and measures, and at the end of the year in my annual report I stated that 206,350 pieces of apparatus had been tested by our inspectors. Last year 265,545 were tested, an increase of 59,000 in round numbers.

The following percentages will indicate more clearly the progress made during these 10 years:

Apparatus tested

Apparatus	Correct		Rejected		Confiscated	
	1914	1923	1914	1923	1914	1923
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Counter scales	22	74	25	24	53	2
Spring scales	36	85	40	8	24	7
Platform scales	27	78	66	20	7	2
Weights	25	70	40	20	35	10
Linear measures	25	97	8	1	67	2
Liquid measures	16	93	5	1	79	6

This shows the progress attained in the 10 years of work of the bureau of weights and measures organized by Mr. Holbrook.

Our weights and measures organization differs somewhat from the one most commonly found in the different States. The force of the bureau consists of a chief inspector, an assistant chief inspector, and eight insular inspectors. I must explain that I am not the chief inspector any more. I left that position in 1917. Now I am the secretary, and head of the department under which the weights and measures department is placed.

Each municipality has a weights and measures inspector, but only in five or six of the principal towns do these officials dedicate all their time to weights and measures work; in the rest of the towns, having other municipal duties to attend to, the attention given by these employees to weights and measures activities is rather limited. Nevertheless, in all matters pertaining to weights and measures they take their orders from and follow the suggestions of the chief inspector. The island is divided into seven judicial districts, and we have one insular inspector in each district, who is supposed to inspect the work done by the municipal inspectors; but in actual practice, due to the limited funds at the disposal of the municipal inspectors, more than half of the actual work of testing the instruments in the stores, especially in the rural districts, has to be performed by our district inspectors. Thus, as you may imagine, they are kept busy all the year round to make just one annual inspection of each store in their district.

Naturally most of the new instruments are imported from the States, and they must be tested at the ports of entry before being offered for sale, and every instrument that comes to Porto Rico is submitted to a rigid test before it can be offered for sale. Last year the total number of new instruments tested was as follows: Counter scales, 572; spring scales, 1,270; platform scales, 154; weights, 36,159; liquid measures, 11,323; linear measures, 17,496; glass graduates, 1,697; and milk bottles, 20,736.

Sugar being the main product of the island, the inspection of the large-capacity scales used by the centrales to weigh the cane bought from the colonos constitutes during the crop season the hardest problem our insular inspectors have to face, these scales being located all around the coast of the island and the transportation of a suffi-

cient number of weights being quite expensive, with the funds at our disposal limited. I might add that we have large sugar mills in Porto Rico, one, I think, being the second largest sugar mill in the world. The bureau has not been able to acquire a test car, and the railroad scales are tested with the aid of 10 tons of test weights, using at the same time the weight of an all-steel car as a standard weight, after having carefully weighed it at the beginning of the trip. Last year we tested 76 railroad scales and 173 cart scales, the percentages correct being 76 and 66, respectively. The regulations and tolerances we use are those adopted by the Eleventh Annual Conference of 1916, and we are following these closely and have embodied also all of the latest regulations adopted by the subsequent conferences.

Our experience with regard to gasoline pumps is that about half of them are actually being used simply to draw the liquid, which is then measured independently. The owners of the pumps seem to have much trouble to maintain them within the required exactness.

Lately the bureau had to test five gasoline delivery trucks of 1,000-gallons capacity each, divided into four compartments. To determine the exact location where the gauge indicator should be sealed, we had a 25-gallon portable measure made and equipped with a 3-inch quick-action gate valve to empty the measure.

Taxicabs have just made their appearance in Porto Rico, and we are inspecting the taximeters employed on them, too. You see, therefore, that Porto Rico is up to date, and all your problems are our problems, and they are met and solved by our inspectors.

Comparing last year's figures of packages reweighed with those that appeared in our first annual report, we find that in 1914 59.76 per cent were correct; last year we had 68.20 per cent; heavy packages were 31.07 per cent in 1914 and 24.88 per cent last year; while light packages were 9.17 per cent in 1914 and 6.92 per cent last year.

In 1921 the legislature passed a law limiting the size of loaves of bread to 1 pound, one-half or one-fourth pound, or multiples of 1 pound, and requiring the bread to be sold wrapped and the wrapper to show the name of the bakery, price per pound, and the weight and price of the loaf. This law was put in force with the cooperation of all the bakeries, with the exception of an occasional attempt from some of them to manufacture loaves smaller than one-fourth of a pound. This law is being enforced very successfully, and we have not had any trouble with the bread manufacturers.

Our problems are the same as those that confront you. All our food and other articles are imported from the United States, so that our inspectors have to exercise vigilance in respect to the wholesale trade to see that it complies with the net-weight requirements as well as in respect to the retail trade to curb any tendency toward short weight.

To enable us to enforce our law the legislature appropriated last year $24,707.65 for salaries and $9,250 for stationery, traveling expenses, transportation, etc.; that is, a total of $33,957.65 for weights and measures regulation, this including, of course, the force charged with the inspection and test of electric, gas, and water meters.

Though the number of violations has decreased, 745 complaints were registered last year, obtaining 637 convictions with fines amounting only to $1,683, the average fine being, of course, rather small.

As I have already mentioned, our bureau is also charged with the testing of electric, gas, and water meters, this new service being under the care of an electrical engineer with two assistants. We have, therefore, equipped a small laboratory with a complete set of primary standards, duly tested by the Bureau of Standards, and a double set of direct and alternating current portable test sets for electric meters and a portable cubic-foot standard for gas to test the gas company's gas prover. With our reduced force provided for by the budget, our attention is specially devoted to the investigation of complaints, when consumers and public utilities can not agree, and to the routine investigation of the meters in use by the companies after being tested by them and installed. Our law providing for the inspection of these meters provides that all the meters in use shall be tested, but the legislature failed to provide us with the necessary facilities to carry out this provision of the law, so we are restricting our inspections to such apparatus as is the subject of discussion between the company and the consumer.

During the year these inspectors of meters tested 1,662 electric meters, 25 water meters, and 8 gas meters, a total of 1,695, distributed in 34 different towns; 369 were found with errors, as follows: Plus, 211; minus, 94; and 64 defective (creeping, etc.), the errors as a rule being slightly above the permissible variation.

I shall now discuss the metric system in Porto Rico, and I am very sorry to have to do it. Prior to 1898, Porto Rico being a Spanish possession, the metric system was the only legal system in use. The Americans brought the English system, so that ever since both the metric and the English systems have been in use; and due to the fact that nearly all the imports are from the States, the English system has superseded the metric system in its entirety. Here I want to call the attention of the opponents of the metric system to the arguments continuously brought forward by them as to the difficulties of implanting the metric system throughout the Nation. In Porto Rico it has been proven that the people readily change from one system to another, and it only requires a couple of years before they become completely accustomed to the new system. In several municipalities, ordinances have changed the system used in meat markets from pounds to kilos and back again, without any apparent hardship, and if we use more extensively the English system throughout the island it is simply due to the fact that our imports from the States are always based on that system, and the retail trade follows the wholesale. But the public is much more in favor of the metric system than of the English system, the superiority of the former over the latter being beyond discussion.

That is my report of the weights and measures work in Porto Rico, and I think that you will gain the following general idea of the situation from what I have said: We have a very efficient law and we have a set of rules and regulations adopted in accordance with the advice of the Bureau of Standards. We always follow the instructions of the Bureau of Standards, so we are on the safe side. We are

sure we are not failing in any respect, and in this work we are indebted to Mr. Holbrook, to whom we owe this fine administration of weights and measures in Porto Rico.

Before I finish my remarks I think it is only just to you that I draw your attention to the beautiful island of Porto Rico. You should be proud of this insular possession. Your Nation has done a great work in Porto Rico. This island came into the hands of the American Nation as a result of the Spanish-American War, and the progress attained under the influence of the American Nation is marvelous. This progress has been attained not only through the efforts of the officers that the United States Government sent down there, but also through the residents and the people of Porto Rico.

We devote one-third of our incomes to education and about two-thirds of our income goes for education, public works, and sanitation. We take pride in a most beautiful system of roads. and our public health service is a remarkable institution under the circumstances prevailing.

This is a beautiful island in the Carribean, and such a fine morning as we are enjoying here to-day, we enjoy every day in Porto Rico, with bright sunshine and an azure blue sky. If you can find time in the future I wish you would make a visit to Porto Rico, for I know you will enjoy it, and it will be an honor and a privilege for us to have you visit us at any time. You certainly will be proud of the work accomplished by the American Government in Porto Rico.

DISCUSSION OF ABOVE PAPER

The Chairman. I am sure, gentlemen, that I express the sentiment of all of you when I say that Mr. Saldaña has given us a most instructive and interesting account of the weights and measures work in the island of Porto Rico. Does anyone wish to discuss the paper?

Mr. Dale. Mr. Chairman, I would like to ask Mr. Saldaña to what extent the Spanish vara was used in 1914 when this reform was begun.

Mr. Saldaña. It was very extensively used, almost universally used; the meter was used only occasionally.

Mr. Dale. Do they use it yet to some extent—the Spanish pound, and the vara?

Mr. Saldaña. No; not at all. They are not permitted now by law.

The Chairman. It is interesting to know that the population can change over from the metric to the English system and back without trouble.

REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES ON SPECIFICATIONS AND TOLERANCES FOR FABRIC-MEASURING DEVICES, PRESENTED BY F. S. HOLBROOK, CHAIRMAN

Mr. Chairman and gentlemen, the committee on specifications and tolerances desires to bring before the conference at this time specifications and tolerances for fabric-measuring devices.

To refresh your minds on this subject we may state that several years ago the conference by resolution referred to the committee the question of specifications and tolerances for fabric-measuring devices, with the suggestion that the committee proceed with the con-

sideration of these devices, and bring back to the conference a report thereon for its consideration.

The first year the committee assembled the devices at the Bureau of Standards and studied them, and at the Fifteenth Annual Conference tolerances on these devices were proposed to you with the suggestion that they be tentatively adopted, and this action was taken. At the same time Ralph W. Smith, of the bureau, gave a very excellent paper describing a method of testing these devices, which was adopted by the conference as the standard method of test. Your committee continued its work and last year, at the Sixteenth Annual Conference, specifications having been developed by the committee, these were proposed to you and again it was suggested that a tentative adoption be had in order that you and the manufacturers might study the recommendations in detail at your leisure and determine their practicability and workability. It is these tentative specifications and tolerances which the committee brings before you to-day for action.

In the meantime your committee has been examining and testing devices of this character on its own account and has also been receiving and studying suggestions made in connection with the tentative code adopted. As a result of this consideration your committee has to report that only one amendment to the tentative code is suggested. This amendment is to a tolerance figure. In general, in the tolerance table, the tolerances on excess deliveries have been made somewhat greater than the tolerances on deficient deliveries except in one case, the tolerance on the yard, in which the tolerance in excess and the tolerance in deficiency were made the same figure; that is, one-quarter of an inch. The committee now desires to suggest that the tolerance in excess on the 1-yard graduation be increased. In the case of used machines in the field we recommend that the tolerance in excess be increased from one-fourth inch to three-eighths inch on registrations of 1 yard or less. That will increase the tolerance on new machines from one-eighth inch to three-sixteenths inch, and will result, if it has any effect at all, in a slightly greater average delivery to the customer. So far as we have learned, users of the machines do not object to this increase in tolerance, and the change has the decided advantage of making it somewhat easier for manufacturers, who have had some difficulty in some cases in controlling backlash within the old limits, to produce the machines. On these accounts, and also since the new value can not be considered an unjustifiably large one, it seems that the amendment suggested is an entirely reasonable one.

As we have stated, these tolerances have been before you for two years and the specifications for one year. Last year they were distributed to the conference in mimeographed form. Following the conference a large number of copies were distributed by mail, and they were also included in the printed proceedings of last year's conference. We therefore have no doubt that you are entirely familiar with these specifications and tolerances, copies of which are now again placed in your hands for reference. With the amendment suggested above these will now read as follows:

SPECIFICATIONS AND TOLERANCES FOR RETAIL FABRIC-MEASURING DEVICES

DEFINITION.—A fabric-measuring device is a mechanism or machine adapted to measure and automatically indicate the length of fabric passed through it. A computing fabric-measuring device is a fabric-measuring device which automatically indicates the total price of the amount of material measured, for a series of unit prices. Unless otherwise specifically indicated by the context, the term "fabric-measuring device" as used herein shall be understood to include computing fabric-measuring devices.

NOTE.—The following specifications shall be applied only to fabric-measuring devices designed and constructed to measure fabrics at retail.

SPECIFICATIONS.—1. Fabric-measuring devices shall be graduated in units of the customary system and its usual subdivisions. The maximum value of the minimum length graduations on fabric-measuring devices shall be one-eighth yard.

NOTE.—This shall not be understood to exclude fabric-measuring devices graduated in the metric system. (See Specification No. 12.)

2. The length graduations and the value graduations on all fabric-measuring devices shall be clear and distinct and their length shall be so varied or they shall be so arranged that their meaning or value is readily apparent and their indications may be conveniently read. The width of any graduation mark shall in no case be less than 0.008 inch.

3. The clear interval between one-eighth yard graduation marks on fabric-measuring devices shall not be less than eleven-sixteenths inch (0.6875 inch); if inch graduation marks are employed the clear interval between such inch graduation marks shall not be less than one-eighth inch (0.125 inch). These values shall be applied to the most sensitive indicating element with which the device is equipped.

The clear interval between value graduation marks on fabric-measuring devices shall not be less than 0.02 inch.

4. Value charts may be made in accordance with either of the following principles:

(*a*) If the device is so designed and constructed that it purports automatically to compute for a series of unit prices the total price for every length within the range of the device, then the device shall be equipped with a value pointer or indicator and value graduation marks; the value graduation marks shall be correctly placed; and in any position which the indicator or pointer and the chart may assume there will be exposed to view a sufficient number of value figures and graduations to permit the value indications of the device to be read correctly. The value graduations shall not exceed 1 cent at all prices per yard up to and including 30 cents. At any higher price per yard the value graduations shall not exceed 2 cents: Provided, however, That nothing in the above shall be construed to prevent the placing of a special value graduation to represent each 5-cent interval. These special graduations may take the form of dots, staggered graduations, or similar forms. They shall be so placed that their meaning and value may be clearly understood, but they shall not be placed in the space between the regular graduations.

(*b*) If the device is so designed and constructed that it purports automatically to compute only for lengths corresponding to a definite series of length graduations, then there shall be no value graduation marks and at no position which the chart may assume shall two value figures for the same unit price be completely and clearly exposed to view at the same time. One of the following alternatives shall also be complied with: (1) There shall be a value computation for each length graduation throughout the range of the device; or (2) no value indication may be exposed to view except at such times that the device registers a length indication for which a correct value indication is provided; or (3) each column or row of value graduations shall be clearly and conspicuously marked with the length graduation to which the values correspond, the device shall be marked with the character and limitations of the computations made, and there shall be a computation for at least each one-eighth yard, throughout the range of the device.

All money values corresponding to definite length graduations must be mathematically correct except as follows: If the mathematically correct amount includes a fractional part of a cent, the fraction shall be dropped if it is less than one-half, but if the fraction is one-half or more the next higher cent may be shown.

5. Each pointer or indicator used in a fabric-measuring device shall be so designed and constructed that a clear, distinct, and accurate reading is given. All pointers or indicators shall be symmetrical about the graduation marks at which they may stand and shall reach to all such graduation marks. The width of the pointer or indicator, or of the end thereof, shall not exceed the width of the smallest graduation marks on the scale with which it is used and in no case shall such width exceed 0.015 inch. The distance between the pointer or indicator and its scale shall not exceed 0.06 inch.

6. Fabric-measuring devices shall be so designed and constructed that in any position which the indicator or pointer and the chart may assume in its operation there will be exposed to view a sufficient number of figures and graduations readily to permit the length indications of the device to be read correctly.

7. Fabric-measuring devices shall be so designed and constructed that the indicating elements used in registering lengths or prices of deliveries to individual purchasers are returnable readily to a definite and clear zero reading before the next measuring operation is begun.

8. All fabric-measuring devices shall be correct in their length and value indications whether the indications are being increased or decreased.

9. If a fabric-measuring device will not give correct results when used for the measurement of all fabrics, then the device shall be so marked as clearly to indicate its limitations.

10. All markings, instructions, figures, and graduations required under these specifications shall be of such size, design, material, and location and shall be so applied or affixed that they will not tend easily to become obliterated or illegible.

11. All fabric-measuring devices and all devices designed to be attached thereto and used in connection therewith, shall be of such construction that they are not designed to and may not be used to facilitate the perpetration of fraud.

12. Nothing contained in the above specifications shall be understood or construed to prohibit the sale or use of fabric-measuring devices constructed or graduated in units of the metric system.

The tolerances to be allowed on fabric-measuring devices constructed or graduated in units of the metric system, shall be the same as those specified on similar devices of an equivalent size in the customary system.

TOLERANCES.—The tolerances to be allowed on the delivery of retail fabric-measuring devices in excess (underregistration of device) and in deficiency (overregistration of device) to be applied on both increasing and decreasing registrations of the machine shall be the values shown in the following table: Provided, however, That the manufacturers' tolerances or the tolerances on all new retail fabric-measuring devices shall be one-half of the values given:

Machine indication	Tolerances on delivery of retail fabric-measuring device [1]	
	In deficiency (overregistration)	In excess (underregistration)
Yards	*Inch*	*Inch*
[2] 1	1/4	3/8
2	1/4	3/8
3	5/16	3/8
4	5/16	1/2
5	3/8	5/8
6	3/8	3/4
7	1/2	1
8	1/2	1
9	5/8	1 1/4
10	3/4	1 1/2
11	3/4	1 1/2
12	7/8	1 3/4
13	7/8	1 3/4
14	1	2
15	1	2

[1] "Tolerances on delivery" refers to the variations between the indications of the fabric-measuring device and the corresponding actual lengths of testing strip passed through the device, and does not apply to check measurements made upon lengths of fabrics which have been commercially measured.
[2] Or less.

For machine indications of more than 15 yards add one-sixteenth inch in deficiency and one-eighth inch in excess per indicated yard.

Respectfully,

(Signed) F. S. HOLBROOK, *Chairman*,
WM. F. CLUETT,
WM. B. MCGRADY,
Committee on Specifications and Tolerances.

DISCUSSION OF ABOVE REPORT

MR. HOLBROOK. The recommendation of the committee is that these specifications and tolerances be now brought up for final adoption that they may be put into force and effect in the various States. I do not know how you would prefer to handle this. The report might be discussed in detail if you desire to handle it that way.

MR. SCHWARTZ. Mr. Chairman, I move that the specifications and tolerances, with the amendment suggested, be finally adopted.

The Chairman. Does any member of the conference wish to raise any question on this report?

Mr. Schwartz. Mr. Chairman, as Mr. Holbrook has explained, this has been under consideration for two years. The only change made this year is in one tolerance figure. I would suggest that it is the desire of the conference to adopt the report as a whole. I do not see anything here that we should change.

The Chairman. Are you ready for the question?

Mr. Emery. I understand that Mr. Holbrook made a recommendation that a certain change be made. I move that this amendment be adopted first.

Mr. Schwartz. I second the motion.

(The question was taken, and the motion was agreed to.)

The Chairman. Now we will consider the report as a whole.

Mr. Schwartz. Mr. Chairman, I now renew my motion that the report as a whole be finally adopted.

(The motion was seconded, the question was taken, and the motion was agreed to.)

UNIFORMITY OF REGULATIONS FOR MILK BOTTLES

By Ralph W. Smith, *Bureau of Standards*

At the first meeting of the Annual Conference on Weights and Measures in 1905, Doctor Stratton, in his opening remarks, stated that the reason for calling the conference was the existing lack of uniformity in the weights and measures laws and regulations of the different States and the obvious need for cooperative effort on the part of the officials concerned with the enforcement of these laws and regulations if this condition were to be remedied. Since that time the constant effort of the conference has been to promote uniformity throughout the United States in the statutes, the specifications, and the tolerances affecting weighing and measuring devices, and to coordinate the activities of the officials charged with the duty of giving effect to these regulatory measures.

The advantages of uniformity and proper coordination of effort are too well understood by all of you to need elaboration at this time. The notable achievements of the annual conferences in this direction constitute the best evidence of your lively appreciation of the value and desirability of realizing these advantages in the country-wide administration of weights and measures supervision. Without uniformity of written rules, without cooperation of administrative officers, the work in each State is made more difficult, the general efficiency of the separate departments is lowered, industry is needlessly hampered, and the ultimate service rendered to the people of your several communities is lessened. And these unfortunate results, with no compensating advantages, come about notwithstanding the individual excellence of the regulations which may be in force in any given jurisdiction, and notwithstanding the individual zeal of the several weights and measures officers.

But, however much has been accomplished already, the need for continued effort along these lines still exists. A conspicuous example of the divergence which still prevails in the requirements governing

weighing and measuring devices may be found in the case of bottles used for the sale of milk and cream. The simplicity of the articles themselves (milk and cream bottles) emphasizes the inconsistency of conflicting regulations affecting them. Here, if ever, it would appear that what is suitable for one jurisdiction should be suitable for all. And yet we find that many of the States having regulations for milk and cream bottles have introduced, by statute or otherwise, special requirements of their own, which inadvertently have resulted in requirements for bottles, especially marking requirements, not uniform in many respects.

Let us consider briefly the situation as it exists to-day in relation to milk and cream bottle regulations: We have at hand data on the requirements of 31 States, these requirements being about equally divided between statutory regulations and regulations promulgated as specifications under statutory authority. No effort will be made to give these requirements in detail, because, after all, it is only the summary which interests us at this time. In the totals which follow the total number of States having requirements of different kinds under a particular heading will not necessarily equal the total number of States reported upon since all States do not have regulations upon all of the points considered.

For convenience in making this analysis, the recommendations of the conference will be considered as standard, and States having adopted the conference recommendations in any particular will be reported as having "standard" requirements on the particular point in question. To refresh your minds upon the conference recommendations it may be said that these provide that the bottle shall be made only in sizes specified under the heading "Liquid capacity measures"; that the bottle must be marked on the side with its capacity and on the side or bottom with the name, initials, or trademark of the manufacturer; that the filling point shall be one-fourth inch below the cap seat on bottles having an inside diameter of not more than 2 inches immediately below the cap seat, and that the filling point shall be one-eighth inch below the cap seat on bottles of larger diameter than that just specified; and that the tolerance on individual bottles of a capacity of 2 quarts, 3 pints, 1 quart, 1 pint, one-half pint, and 1 gill shall be, respectively, 6, 5, 4, 3, 2, and 2 drams, with the tolerance on average capacity one-fourth of these values.

We find then that, in the matter of permitted sizes, 18 States are standard; 3-pint bottles are not recognized in 3 States; in addition to these, neither 3-pint nor gill bottles are recognized in 5 States; 1 State permits a 10-ounce bottle in addition to the standard sizes; and 1 State permits a third-quart bottle in addition to the standard sizes.

In the matter of filling point, 13 States are standard; 10 States require the bottle to be correct when filled to the cap seat; 1 State specifies a filling point one-eighth inch below the cap seat; 1 State specifies as the filling point the cap seat or some other definite point; and the regulations of 1 State are to the effect that bottles of a capacity of 1 quart or under shall hold their correct capacity when filled to a point not less than one-fourth inch below the cap seat, with the distance for larger sizes in proportion.

On the question of tolerances we find the regulations of 15 States to be standard; 5 States have special tolerances differing in one or more respects from the conference recommendation.

As to capacity marking we find 23 States requiring the capacity to be marked upon the side of the bottle; 2 States require that the capacity be shown, but do not specify the location desired for this marking. Three States require that the word "sealed" appear on the side of the bottle. The name, initials, or trade-mark of the manufacturer is required upon the side or bottom of the bottle by the regulations of 20 States, this being the standard requirement; 3 States require this marking without specifying its position; 1 State specifies that this marking shall be upon the bottom of the bottle; and 1 State requires that the name, initials, or trade-mark of the dealer shall appear on the side of the bottle or on the cap.

A designating number is required upon the side or bottom of the bottle by 6 States; 1 State requires this marking on the bottom of the bottle; 1 State requires that this appear upon the upper half of the bottle; and 1 State requires this marking without specifying its position.

A special character of marking is required in 2 States, this taking the form of the State seal in one case and the abbreviation of the State name in combination with the word "seal" in the other case.

In 5 States a bond is required of the manufacturer as a guaranty that the bottles marked in conformance with the State requirements shall conform in all respects to the regulations affecting capacity, etc.; 1 State provides that the bottle manufacturer complying with its regulations shall be licensed.

Confronted with this diversity of regulation, the manufacturers of milk bottles, some two years ago, solicited the cooperation of the Bureau of Standards and of the Annual Conference on Weights and Measures in reducing the multiplicity of requirements as nearly as might be to a single standard, so that the business of manufacturing bottles might be simplified. This simplification would, of course, eventually be reflected in lower bottle prices.

The proposition of the manufacturers was embodied in a series of recommendations, as follows:

First, that in the regulation relative to the marking of milk bottles, only the word "sealed" be required, together with the bottle manufacturer's designating mark and number.

Second, that the Bureau of Standards be authorized to cooperate with bottle manufacturers and State authorities in establishing a designating mark and number for each manufacturer; that these be registered in all States and be accepted by the States as their requirements on this point of practice.

Third, that a uniform point to which capacity is to be measured be adopted, and that all of the States bring their laws and regulations into conformity on this point.

Fourth, that the tolerances on capacity, issued in Circular No. 61 of the Bureau of Standards, be confirmed and adopted as standard by all States and municipalities.

Fifth, that the Bureau of Standards recommend and the States adopt a standard method of determining capacity.

Sixth, that milk bottles be standardized as to volume, for half gallons, quarts, pints, half pints, and quarter pints, and that the use of sizes other than these be forbidden by law.

Seventh, that the regulations in the municipality agree with those in the State in which the municipality is located.

These recommendations were made at the Fifteenth Annual Conference in 1922, and since that time the bureau, in cooperation with the conference, has been endeavoring to work out some plan of relief along these lines, because we have felt that the principles upon which the request of the manufacturers was based are well founded and that the recommendations which they made are entirely reasonable ones.

Passing for the moment to the third recommendation of the manufacturers, in relation to a uniform filling point for bottles, you will recall that at the conference last year a report was made by the bureau on the investigation which was conducted as to the manner of filling milk bottles prevailing in a number of representative cities under what may be considered as good commercial practice. The conclusions reached at that time were that present-day filling methods result in milk and cream bottles being filled to an average height of approximately one-fourth inch below the cap seat. This condition conforms to the recommendations of the conference and of the bureau in reference to the filling point on the bottles. But it is obvious that if a bottle holds its correct capacity only when filled to the cap seat, and if the average bottle of to-day reaches the consumer filled only to a point one-fourth inch below the cap seat, full measure is not being delivered. It follows, therefore, that the "quarter-inch recommendation" should be adopted if we are to adhere to the principle of full measure deliveries, and the former action of the conference on this point appears to be entirely justified.

Before concluding this phase of the investigation, however, we desired to learn more about the attitude of the users of milk bottles on this question of filling point. Accordingly, at one of the sessions of the annual convention of the International Milk Dealers Association, held in Rochester, N. Y., in October, 1923, Mr. Holbrook, of the bureau, presented the results of the milk bottle investigation just referred to. Following Mr. Holbrook's remarks, and after a brief discussion, the convention passed a resolution placing the association on record as favoring the use of bottles made in accordance with the recommendations of the bureau and of the annual conference; that is, bottles holding their nominal capacity when filled to a point one-fourth inch below the cap seat or stopple. This, of course, refers to bottles of ordinary neck diameter.

As a result of this action on the part of the milk dealers, we now have a very general sentiment in favor of this requirement. As far as the consumer is concerned we know that the ultimate purchaser of the milk prefers definite full measure to the consistent, even though slight, short measure which inevitably results from the use of a bottle which is standard when filled completely to the cap seat. The attitude of the weights and measures officials is indicated by the action of the conference in adopting the "quarter-inch recommendation." The bottle manufacturers have said that it is a matter of

indifference to them as to where the filling point is, provided that they may make all of their bottles on the same basis.

As stated earlier, there are at least 10 States which now require that bottles shall hold their correct capacity when filled to the cap seat. In view of what has already been pointed out, it would appear that the logical solution of this phase of the problem is for these last-mentioned States so to change their laws or their regulations as to make them conform to the recommendations of the conference and of the bureau. This action should be taken for two reasons: First, to secure uniformity on what appears to be the best basis; and, second. to make it possible for dairymen to give full measure when selling bottled milk.

So much for the important question of the filling point for the bottle. As to the recommendation of the manufacturers that the tolerances already adopted by the conference be adopted by all States and municipalities, we find that, so far as we have been able to discover, only five States have adopted tolerances differing from those recommended. Our opinion is that the tolerances adopted by the conference are reasonable and fair to all concerned, and that it would be very helpful to the weights and measures officer and to the industry if uniformity in this respect could be realized.

The fifth recommendation of the manufacturers had to do with the method of testing bottles for accuracy. This matter was covered at the last conference by the paper on this subject presented by E. L. Peffer, of this bureau. In this connection it may be said that at least one manufacturer of precision glassware has duplicated the special bulb burette developed by the bureau for the laboratory testing of milk bottles and described in Mr. Peffer's paper, so that officials desiring to secure this apparatus may do so without difficulty.

The sixth recommendation of the bottle manufacturers was to the effect that only bottles of the capacities of half gallon, quart, pint, half pint, and gill be permitted in use. This conforms to the former action of the conference as to the capacities mentioned, but would eliminate the 3-pint bottle which the conference specifications allowed. In the opinion of the bureau the 3-pint bottle is used but very little if at all, and all mention of this size might be omitted from our specifications without any harmful results. A few States have authorized the use of additional sizes of milk bottles, one State permitting a 10-ounce bottle, and another a third-quart bottle. We feel that the use of odd-sized bottles of this character is not advisable because these sizes are near enough to another regularly recognized size which is slightly larger, so that misrepresentation is almost invited.

Directly relevant to the consideration of this question of permitted nominal capacities of milk bottles is the decision recently reached by representatives of the bottle manufacturers, the bottle-cap manufacturers, and the dairymen in relation to a simplification of style and type of bottle. These various interests requested a conference with the division of simplified practice of the Bureau of Standards, and it was eventually decided to standardize upon three heights each for quart, pint, and half-pint sizes, to eliminate entirely the quarter-pint size, and to manufacture all bottles so that one size of cap would meet the requirements of all varieties. The reason for

desiring this simplification was to reduce the waste and confusion incident to the manufacture and use of the excessive number of types which had gradually been developed. The need for simplification is apparent when it is pointed out that quart bottles were regularly being manufactured in 12 varieties, pint bottles in 13 varieties, half-pint bottles in 14 varieties, and quarter-pint bottles in 10 varieties, while the caps to fit these different varieties were being cut in 10 different diameters. The report of this conference is known as Simplified Practice Recommendation No. 10, and has been printed under that title.[2]

Thus we see that the manufacturers have already been able to effect a very satisfactory degree of standardization in the matter of bottle capacity through voluntary agreement among themselves and allied interests. We do not consider that it is necessary for the annual conference to modify its former recommendation along these lines. We can see no particular objection to dropping the 3-pint size for milk bottles if you desire to take this action; but, on the other hand, if this size of bottle is not used to any appreciable extent the fact that it is recognized as a suitable size can do no harm. The use of the quarter-pint, or gill size, is entirely logical, and in many places it is very popular for the sale of cream. The only argument for discontinuing this size is the one of reduction of unnecessary types, and while this argument may be entirely sound from the economic standpoint, nevertheless from the weights and measures standpoint it would be difficult to defend the elimination from the list of permitted sizes of the gill, or quarter-pint, bottle.

The seventh recommendation of the bottle manufacturers, that the regulations of a municipality agree with the regulations issued by the State in which the municipality is located, is so obviously desirable that no discussion is necessary.

Returning now to the first and second recommendations, which have to do with marking requirements, we enter the field where the greatest divergence exists among the various States. It has been shown that certain marking requirements are quite generally made, but that in relation to others there is very little uniformity. The specifications adopted by the conference and recommended by the Bureau of Standards require but two marks, first, the capacity on the side of the bottle, and second, the name, initials, or trade-mark of the manufacturer on the side or bottom of the bottle. The manufacturers suggest, in addition to the capacity, the word "sealed," together with the bottle manufacturer's designating mark and number, urging that a designating mark and number which may be recognized in all States be assigned to each manufacturer by the Bureau of Standards after the bureau has conferred with the States and the manufacturers on this question. The manufacturers stand ready to agree that all bottles so marked will be made with the same care and attention which are now given to bottles marked in a specific manner for sale in a particular State and manufactured under bond to the State in question. They are also perfectly willing that any reasonable character of marking, differing from that

[2] Copies of this publication may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 5 cents.

proposed by them, be required, provided only that bottles marked in accordance with the requirements agreed upon will be accepted in the different States.

As we look into this question, it appears that many of the special marks now required by law or regulation have been specified in an effort to have this marking approximate the seal which the weights and measures officer normally places on a scale or measure to signify his approval of the device for commercial use; but the ultimate purpose of these marks is to identify bottles so marked as bottles which conform to the requirements of the State in question and which may legally be used in commercial trade. As to the name, initials, or trade-mark of the manufacturer, and the designating number, the only purpose of this marking is to identify the maker of the bottle and fix the responsibility for its accuracy, except in the case of the one State which specifies that the name, initials, or trade-mark shall be those of the dealer using the bottle. It would seem, therefore, that, with the exception noted, every purpose served by present marking requirements could be served equally well by a uniform sealing mark and by a single designation for each manufacturer. The principal difficulty of putting this program into effect lies, of course, in the changes which will be necessary where the marking requirements at present in force are incorporated in the statutes; in those cases where these requirements are promulgated by the State weights and measures officer the necessary modifications may readily be made. The difficulties are by no means insurmountable, however, and may all be overcome if the officials of the several States will make a concerted and earnest effort to arrive at a condition of uniformity.

The Bureau of Standards will be glad to do its part in carrying out this entire program as outlined, by acting as a disinterested clearing house in all matters affecting milk bottle regulations. We can bring again to the attention of all the States the conference code of specifications for milk bottles, modifying this, perhaps, in such minor respects as including a number as a part of the designating mark as the manufacturers and many of the States desire. We can compile a list of designating marks for all bottle manufacturers now in the business and as new firms enter this field from time to time, we can assign to each a designating mark to distinguish its products.

However, to make this plan effective it will first be necessary for the States to secure the required modifications in their laws or regulations so that the uniform specifications and marking requirements may be adopted; and, second, it will be necessary for the States to adhere to the recommendations of the bureau in respect to the designating marks to be assigned to the different manufacturers. I am sure you will agree that without this cooperation nothing worth while could be accomplished.

Before undertaking anything along this line we wish to have an expression of the opinion of the conference as to the advisability of such action, and if the response is favorable to proceeding with the plan we wish to have some indication of the support which will be accorded by the weights and measures officials in pushing matters through to a point where we can actually have uniform regulations for milk and cream bottles throughout the United States. As stated before, the bureau is heartily in favor of accomplishing

this, and we believe that all weights and measures officers will appreciate the advantages which will result from such a course to all concerned. If in some States certain individual requirements now in force must be given up, it should be remembered that the program outlined involves no sacrifice of essentials, but only the modification of form, and such loss as is inevitable will be much more than compensated for by the benefits of standardization and uniformity.

DISCUSSION OF ABOVE PAPER

The CHAIRMAN. Gentlemen, this exposition of the milk-bottle situation is before you. Will you discuss the paper?

Mr. FOSTER. I would like to ask one question. With us a great many dairies insist on having their names blown in the bottles. If that is not done the bottles become common property and unscrupulous dealers profit by the bottles that the other fellow buys and the innocent party has no way of claiming his bottles.

Mr. SMITH. There is no intention, Mr. Foster, of preventing a dealer from having his name blown in a bottle. I think that is an excellent provision; that is, however, an individual arrangement made by the user with the manufacturer. It is only in relation to the official requirements that I speak.

Mr. FOSTER. When I raised the point, what I had in mind was the number or the multiplicity of dies. What is to be the advantage of the simplification which you recommend if the manufacturers must still continue to make special bottles for individual customers?

Mr. SMITH. Every time they make an additional modification it increases the number of dies and adds to the expense. They can not get away from showing the names of the dairies owning the bottles, but it would simplify the manufacturing operation materially if they made the bottles uniform in other respects. That plan would have the additional advantage of certain marks meaning the same thing in every State, whereas now a designating mark may mean different things in different States. The manufacturers say that this proposal would result in a very desirable simplification from their standpoint. I am not familiar in detail with the savings that would result, but it surely means something to them or they would not have asked for it; and I can not see any objection to it from the standpoint of weights and measures regulation.

Mr. EMERY. I wish to say in this connection that I am not prepared to express an opinion. I know that our law has been very satisfactory, and I do not want in any way to place myself against it.

Mr. ESTES. Mr. Chairman, it seems the plan outlined in Mr. Smith's paper is very logical and one to be desired, especially by people in our official capacities who are working for standardization. Therefore, to express our approval of the plan, I move that this matter be referred to the resolutions committee for appropriate action.

(The motion was seconded.)

The CHAIRMAN. Is there any discussion?

Mr. STOVER. I would like to see all the letters taken off the bottom of the bottle.

Mr. SCHWARTZ. In New Jersey we have a milk dealers' protective association, and they insist that the milk dealer's name be blown in the bottle, indicating the ownership of the bottle. In fact, they have a detective force that goes throughout the State to detect and prosecute dealers who unscrupulously handle the bottles of other dealers. That is the only method they have of protecting themselves from the dealers who buy their bottles from junk dealers or secure them by other questionable methods. If bottles are found in hands of people to whom they do not belong they prosecute. They have a certain agreement along those lines. They would insist on having the name of the dealer blown in. I can see no objection.

(The question was taken, and the motion was agreed to.)

Mr. SCHWARTZ. May I suggest that the gentleman who made the motion prepare the resolution and submit it to the resolutions committee for consideration; also that anyone having resolutions in mind kindly prepare and present them promptly to the resolutions committee for their consideration.

TESTING OF POST-OFFICE SCALES

Mr. HOLBROOK. I desire to take advantage of this opportunity to read a letter from Postmaster General New, addressed to Doctor Burgess, regarding post-office scales. The letter is as follows:

MAY 21, 1924.

GEORGE K. BURGESS,
Director, Bureau of Standards, and President,
Annual Conference on Weights and Measures, Washington, D. C.

MY DEAR DOCTOR BURGESS: The matter of testing post-office scales has been brought to my attention. It is also related to me that you are interested in this subject and may be able to assist us.

We understand that you have your annual conference here in Washington beginning on Monday, the 26th, and that you might be able, at that conference, to outline some policy of cooperation with us.

Would it be possible for the State organizations having to do with weights and measures to test post-office scales periodically, and could this be done without expense to the Post Office Department?

If your conference would discuss this matter and suggest some line of action, then it might be possible for this department to take it up directly with the States, realizing the while that such resolutions as you might pass in this conference would aid us very materially when we would so confer with the different commonwealths.

Yours very truly,

(Signed) HARRY S. NEW,
Postmaster General.

The CHAIRMAN. That is evidently a subject very appropriate for consideration by the committee on resolutions. At the same time it might be well to have opinions expressed from the floor at this time.

Mr. SCHWARTZ. Mr. Chairman, I will state that we have been in the habit of testing scales in post offices upon the invitation of the respective postmasters. We thoroughly recognize that behind the counter it is Federal ground and Federal property. We have no right to go in behind any postmaster's counter and test his scales without a request from him. We do it upon request, but our men, as a rule, do not ask to inspect post-office scales. If the postmaster

feels that his equipment is not up to standard, we are glad to send in a man and have the work done. We are glad to do it without expense to the Post Office Department, it being in line with our regular duties.

Mr. McGrady. I am very glad this question came up. About the year 1912 or 1913 I was engaged in field work in the city of Pittsburgh. In a substation the clerk refused to have the store scales inspected, saying, "This is the property of Uncle Sam." We took it up with Postmaster Davis, and he immediately issued orders giving us the power to go behind the counter anywhere in the main post office or in stations under his jurisdiction.

Mr. Emery. I welcome the suggestion of the Postmaster General. In Wisconsin we have felt the need for testing post-office scales, because our citizens have been paying out money because of errors of those scales, and I think it is properly our function to go into post offices and inspect all their scales. We have gone there when invitations have been extended to us. I know there is a highly technical question raised there, but at the same time we know that the scales in post offices are frequently grievously wrong, and our citizens are paying a large amount of postage that they ought not to pay.

Mr. Holbrook. Doubtless it is not the function of a State or local inspector to test post-office scales without consent. However, that question need not be gone into. In many instances an objection by the local postmaster to the testing of the post-office scales has been made only because he has not been sufficiently advised as to his authority to consent, and also has not been sufficiently advised as to the policy of the Government in that respect. The Post Office Department, realizing, as it does, that it is not in a position to test all its scales at frequent intervals, now desires the cooperation of the State and local weights and measures officials. If this conference indicates to the Postmaster General a general willingness on the part of its members to assume the work of testing post-office scales, then, as I understand it through a conversation with one of the officials of the Post Office Department, it is the intention of the department to issue a general order to the postmasters stating the policy of the department. It is also the intention to take up with the various individual State and local inspectors of weights and measures the matter of testing post-office scales. The authorization may not go to the full extent of having condemnations made, although in offices where a surplus supply of scales is maintained it is probable that the incorrect scale will be immediately put out of use; but the Post Office Department, I think, will request that the postmasters report any incorrect scales immediately to their bureau of supplies and equipment and new or correct scales will be furnished as soon as possible, and the old scales retired. It is along those lines that the Post Office Department wishes your cooperation.

Mr. Bulson. I recall an instance similar to what Mr. Holbrook mentioned. In one case I was called into a post office by a postmaster and the fact that he asked me to test the scale was an indication that he thought it might be defective. I wrote on the report that I made to the postmaster a recommendation that was sent to headquarters and in a short time a correct set of scales was installed.

I would take the same stand every time in regard to the inspection of scales. In my jurisdiction I have a military post, and inspect the scales in the military barracks twice a year. I never go in there unless I am asked, but they did make the requests and got the inspections and in two instances the scales were in very poor condition.

Mr. SEAY. Mr. Chairman, in the last 12 months I have had three experiences with post-office scales. In one case one of the large business houses in Richmond was getting out large shipments of mail matter and the Post Office Department checked up one large shipment upon one scale and advised it would require a certain amount of postage. That evening the firm dumped thousands of these packages in the post office and upon their being weighed upon a different scale it was found they did not have sufficient postage. The entire consignment was held up a day and the next day the firm was required to put on $30 worth of additional postage. The several scales in the post office were then compared and differences found. In another case we found a parcel-post scale on which 6 pounds registered as 5 pounds. That scale was condemned. In another case the parcel-post scale was so stiff that it took a quarter pound to move the beam either up or down.

Mr. SCHWARTZ. I do not see any objection to the conference going on record to the effect that we are only too glad to help in testing their equipment throughout the country, the Post Office Department taking the initiative. I, for one, welcome that idea. I know we are only too anxious to be of whatever assistance we can be to the Post Office Department.

Mr. CLUETT. In Chicago we have a system whereby we charge fees which go to the city treasury. While our department would welcome the right to go in and make the inspections at the different substations, at the same time there would have to be some sort of city ordinance in regard to the payment of fees. So, if that particular matter were to be taken up, at the same time the Post Office Department should also take up with the city of Chicago the question of fees. We would be glad to do the work.

The CHAIRMAN. Is there any further discussion?

Mr. MCGRADY. I move that in response to this letter of the Postmaster General, this conference go on record as extending to the Post Office Department the cooperation of the departments of weights and measures in the various States, wherever possible.

(The motion was seconded, the question was taken, and the motion was agreed to.)

The CHAIRMAN. Is there any further business to come before this session?

(It was moved and seconded at this point that the conference adjourn; the question was taken, and the motion was agreed to.)

(Thereupon, at 4 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m., Tuesday, May 27, 1924.)

THIRD SESSION (MORNING OF TUESDAY, MAY 27, 1924)

The conference reassembled at 9.55 o'clock a. m. at the Bureau of Standards, Dr. George K. Burgess, president, in the chair.

THE NEW JERSEY SALE-BY-WEIGHT LAW

By J. Harry Foley, *Superintendent of Weights and Measures, State of New Jersey*

In New Jersey the sale-by-weight subject is not a new one, having for many years been an advocated project, but not actively advanced until the year 1918. The desirability and advisability of adopting legislation that would provide a more just and equitable basis of trading in dry commodities, were indicated by various issues arising from the use of the dry-capacity measure as an instrument or medium of purchase and sale, any one of which we felt would be sufficient to warrant the change in trade custom. First of all was taken into consideration the certainty that the dry measure provided a ready means for those with dishonest tendencies to perpetrate fraud, and this is a condition that time and effort were ineffectual in overcoming; second, the mature realization that the use of the dry measure at its best, and even when not employed as an instrument with which to defraud, resulted in practically nothing but approximations in the determination of quantities, and, therefore, was nearly always responsible for unfairness or loss to either one or the other of the parties to a transaction; and third, the irrefutable fact that we were continuing to use in modern business a factor which was but a relic of pioneer days that could and should be relegated.

With our decision to attempt a remedy for the situation arose the question of how best to proceed. Should we with one stroke effectually eliminate the dry measure as a medium of purchase and sale or should we first adopt a less drastic means and have enacted a law that would give the purchasing public an opportunity to educate itself in the principles of sale by weight. It should be remembered that to follow out the former method would possibly entail not only considerable inconvenience to all concerned, but economic loss as well, with a probable resultant chaotic state of affairs in household purchasing and in the avenues of merchandising affected. A consideration of these possibilities led us to adopt the latter course, namely, the modified one of enacting a statute that would, while protecting the consumer, educate him in the weights of the various commodities, our thought being to use such an act as an entering wedge and then, after sufficient time had elapsed to permit purchasers to familiarize themselves with weight instead of dry measure elements, to adopt legislation abolishing for all time the dry measure in our State.

In the New Jersey legislative session of 1918, therefore, was introduced and unanimously passed the modified sale-by-weight law which

provided that dry commodities could be sold either by weight or by dry measure, but specified that when sold in units of dry measure there should be a specific represented weight for each commodity in quantities of the bushel and its subdivisions. Due to thorough enforcement this law was productive of much good, and upon its adoption many merchants, and especially the chain-store systems in our State, inaugurated the practice of selling exclusively by weight, perceiving, we will assume, that the "handwriting was on the wall" for the dry measure and that its days were numbered.

While the dual act then adopted undoubtedly produced a better state of affairs in the sale of dry commodities, it did not have the desired effect on the purchasing public who, notwithstanding everything that was done to promote the sale-by-weight proposition, consistently adhered to the old practice of ordering commodities in the elements of the dry measure and apparently made no attempt to learn the weight equivalents. We at first intended to make two years the period that should elapse between the passage of the original act and the introduction of the contemplated strictly sale-by-weight act. At the expiration of this period, however, we found ourselves no further ahead with public education on the subject than we were at the beginning. Pursuing the policy of giving the public every consideration, we decided to delay the introduction of further sale-by-weight legislation till the time when we would feel conditions were more favorable to its success in every respect. The matter was, therefore, permitted to lie dormant until the year 1922 when it was felt that to longer put off the perfecting of an established movement was unnecessary and inadvisable; the maximum of good had been obtained from the dual act, but it was still not enough. The purchasing public continued in the same rut and were making no appreciable effort to learn weight equivalents, so we just decided to take away the dry measure altogether and force the issue. It is characteristic of the public that it must be protected against itself. People, it seems, only take a passing interest in matters that are likely to entail an exercise of their mental faculties, and as the sale-by-weight proposition is one that involves a complete change in custom and incidentally calls for some observation and study, the masses just simply seemed inclined to ignore it even though it meant economic gain to them. It is, therefore, only by compelling people to take some interest in their economic welfare that any advancement can be made, and we have done this in New Jersey by the sale-by-weight law just enacted this year, which takes away the dry measure for good and all.

This act as finally adopted is the product of many investigations, intensive study and numerous hearings in which all most vitally interested have taken part. A number of changes were made in it since it was first presented in 1922 when it struck a snag in our senate in the person of a representative from one of our largest agricultural counties, who wanted to be sure of its effect on the producer; last year it was smothered by too much politics as the result of a highway measure that caused an upheaval in our legislature, but this year brought its success.

I would feel rather remiss were I not to include in this paper abstracts of the more important features of the act as passed. Its

main section tells practically the entire story of the passing of the dry-measure elements and provides that:

> * * * all commodities heretofore commonly offered for sale, or sold by dry measure or by basket, barrel, or container of any kind, except as hereinafter provided, shall be offered for sale or sold upon the basis of avoirdupois net weight or by numerical count only, and it shall thereafter be unlawful for anyone to use or employ any dry-capacity measure, basket, barrel, or container of any kind as a means of determining the amounts or quantities of any such commodities offered for sale, or sold: *Provided, however,* That the provisions of this act shall not be construed to apply to fruits and vegetables sold in the original standard container, nor to vegetables which by common custom are offered for sale, or sold by the bunch; nor shall the provisions of this act be construed to apply to fresh berries and to other small fruits which are customarily offered for sale, and sold by the box, basket, or other receptacle, except, however, when such fresh berries or such other small fruits are offered for sale, or sold in bulk, in which case the provisions of this act shall apply to the extent that such fresh berries and such other small fruits shall be offered for sale, and sold by avoirdupois net weight only: *Provided further, however,* That all fresh berries and such other small fruits when offered for sale, or sold shall be so offered or sold in boxes, baskets, or receptacles of uniform size to hold 1 quart or 1 pint dry measure only, which said boxes, baskets, or other receptacles shall be uniformly and evenly filled throughout.

The act becomes effective on July 1, and is enforceable by the State superintendent of weights and measures, his duly authorized assistants, and all county and municipal superintendents of weights and measures. The penalties provided for violations of the act are: $25 to $50 for first offense, $50 to $100 for second offense, and $100 to $200 for each subsequent offense.

The term "commodities" as used in the act means articles, other than liquids, which are capable of being measured by dry-capacity measure and which have been at any time prior to the passage of the act sold by dry-capacity measure. The term "dry-capacity measure" is defined in the act as referring to the bushel, half bushel, peck, half peck, quarter peck, quart, pint, half pint, and similar measures. The term "original standard containers" is construed to mean and include only barrels, boxes, baskets, hampers, or similar containers, the dimensions or capacity of which is established by law in New Jersey or by act of Congress, the contents of which have not been removed or repacked, and upon which is plainly and conspicuously marked the net quantity of contents thereof in terms of weight, measure, or numerical count.

The exemption of commodities sold in the original standard container came as the result of hearings granted the agricultural interests previous to the final drafting of the act, and it was upon this feature that the success of the measure depended. The impracticability of compelling the farmer to weigh each individual basket and hamper as he filled it was at once made apparent. Permitting him to fill standard containers and send them to market to be resold in their original state was considered logical and advisable, and by making this concession we prevented the formation of a farm bloc against the measure, for they most assuredly would have defeated the attempt for the passage of the law without this exemption being included. Large fruit growers, particularly the apple men, had to be given consideration, and we feel now that the course taken was a wise one in that the act while providing a full measure of protection to the consumer does not impose a hardship on the producer.

The law was really aimed at the retailing end, where the most glaring discrepancies in the use of dry measures were rife. The huckster and peddler—those experts in fraudulent manipulation of dry measures—were especially under the ban.

The purpose of the law, we feel confident, will be amply fulfilled in its present wording; and, while drastic, the law will not greatly affect the even tenor of established trade practices, for the reason that while it abolishes the dry-capacity measure from use in trade in New Jersey it permits the sale of certain commodities by the bunch, such as beets, radishes, and other vegetables, which by custom have always been sold in this manner; it also permits sale by numerical count (a necessary feature in any good sale-by-weight statute) and allows the sale of berries in containers of standard size as heretofore without reference to weight.

Through the mediums of the press, the distribution of literature, and talks before trade bodies and civic organizations we are disseminating full information in regard to the new law and its requirements. We are getting splendid cooperation from all reputable merchants, including the chain-store systems who declare themselves in unqualified favor of the change. The weight method of sale is already being put in effect by these interests, and in their advertisements the chain stores have eliminated all reference to dry measure and are listing the dry commodities which they offer for sale on the pound or numerical-count basis.

We look for very little trouble in enforcing this statute, and that it will be productive of inestimable good is undoubted. It is a step forward in the honest-trade movement; its principles are right in that it substitutes the accurate avoirdupois weight for the indeterminate dry measure and assures efficiency and fairness in the trade relations of the producer, merchant, and consumer.

Mr. Foley. Mr. Chairman, I will leave copies of the New Jersey act here on this desk in case any of the gentlemen want them.

ENFORCEMENT OF THE INDIANA BREAD LAW

By I. L. Miller, *Commissioner of Weights and Measures, State of Indiana*

The Indiana bakery law was enacted by the general assembly of 1919, approved by the governor on March 10, and became effective July 1. This law has been known generally as the "model bakery law," not because of its perfection, but, probably, because it was the first law of its kind and because of the possibility that it might serve as a model for other States. The bill was drawn in accordance with the ideas of bakers, and of food and weights and measures officials, some of them nationally known, after a careful study of bakery conditions and a consideration of the subjects that might properly be included in such a law. It was the first State law I think, fixing standard weights for loaves of bread. The law is, perhaps, the most comprehensive bakery law enacted by any of the States, as will be seen from the title of the act which reads as follows: "An act regulating the sanitary conditions of bakeries, prescribing conditions connected with the manufacture and sale of bakery products and fixing penalties for violation of the provisions

thereof." Everything pertaining to standard weight is contained in section 9 of the act.

The enforcement of the Indiana law and the results obtained will best be understood through a review of the circumstances leading up to its enactment.

The demand for bakery legislation including standard bread weights followed closely the ending of the war and undoubtedly came as the result of the experiences both of the baker and of the consumer under the regulations of the United States Food Administration during the period from its organization under the Lever Act in 1917, to its dissolution in December of the next year. It will be recalled that all bakers using 10 barrels of flour and wheat substitutes were licensed in November, 1917, licensing being extended the following January to include all bakers using three barrels or over of wheat flour and wheat flour substitutes. After the latter date practically all bakers in the country were working under Federal license. Late in 1917 the United States Food Administration issued special rules and regulations governing bakers. Rule No. 1 stipulated that " licensed bakers shall manufacture bread and offer it for sale only in the following specified weights or multiples thereof, which shall be net weights unwrapped 12 hours after baking; 16-ounce units (not to run over 17 ounces) ; 24-ounce units (not to run over 25½ ounces)." A 12-ounce loaf was provided for in February, 1918, when the need for greater saving of wheat was most urgent.

Early in February, 1918, Dr. H. E. Barnard, then United States food administrator for Indiana, organized the baking division and placed it under the supervision of Elmer Cline, of the Taggart Baking Co., of Indianapolis. Under Mr. Cline's direction the organization was very quickly completed, and the baking regulations, especially those relating to bread weights and the use of substitutes, vigorously and effectively enforced. Bakers, almost without exception, cooperated in every way with the division, with most satisfactory results both to the baker and the consumer. The Indiana law was a direct outgrowth of the operations of the bakery division under the United States Food Administration for Indiana.

The bill was passed and approved without any apparent opposition. Section 9, which is the only one of direct interest to this conference, reads as follows:

Bread to be sold by the loaf made by bakers engaged in the business of wholesaling and retailing bread shall be sold based upon any of the following standard weights and no other, namely: A loaf weighing three-quarters of a pound, a loaf weighing one pound, a loaf weighing one and one-half pounds, and loaves weighing two pounds, or some multiple of one pound. These shall be the standard weights for bread to be sold by the loaf, and such bread shall not be sold of other weights. The State Commissioner of Weights and Measures shall adopt and establish by rules such reasonable tolerances or variations within which these weights of standard loaves shall be kept: *Provided, however,* That such tolerances and variations shall not exceed one ounce per pound over and one ounce per pound under the standard unit weight. Every loaf of bread made or procured for the purpose of sale, sold, or offered for sale shall have affixed thereon in a conspicuous place a label on which there shall be printed in plain type the weight of the loaf stated in pounds or fractions of pounds, or both, as the case may be, together with the business name of the baker or manufacturer of the loaf. In case of wrapped bread, such information shall be stated in a plain position upon the wrapper of each loaf, and in the case of unwrapped bread shall be stated upon a label no larger than one by one

and one-half inches in size and not smaller than one inch by three-quarters of an inch, and such label affixed to an unwrapped loaf shall not be affixed in any manner or with any gums or pastes which are unsanitary or unwholesome. It shall be the duty of the Commissioner of Weights and Measures, and of the sealers of weights and measures of any city, town, or county, or any agent thereof responsible for the enforcement of weights and measures laws and ordinances under regulations prescribed by the Commissioner of Weights and Measures, to enforce the provisions of this section.

In December following the signing of the armistice the largest meeting of bakers ever assembled in the State was held in Indianapolis for the purpose of considering some plan of future action in securing proper regulation of the baking industry. At this meeting one of the influential bakers of the State spoke as follows: "We have decided that there were certain features of the regulations of the United States Federal Food Administration that were sound business for all times not because they were directly profitable, but because they were to the advantage of the consumer of our products and were profitable to the baker because of the fact that they would establish confidence between the consumer and the baker and thereby increase the baker's business." This was indicative of the spirit prevailing in this meeting. The bakers approved the appointment of proper committees to undertake the work of drafting a bill in cooperation with the food and drug commissioner, who is also State commissioner of weights and measures, that would embody the features discussed during the meeting.

The bakers met again in January, 1919, during the session of the legislature, and approved a bill which was practically the same as the present law, and the chairman was empowered to appoint a legislative committee to work with the proper State departments and interested consumers in securing the passage of the bill. One of the points discussed by the bakers in their meetings was that of the labeling of the loaf with the standard weights which had been agreed upon. On this point one of the leading bakers of the State said: "I do not see any particular value in having the weight on there as far as the baker is concerned, but I do see some very direct advantages as far as the consumer is concerned; it will let them know they are getting a certain definite quantity of bread. Just picture a 12-ounce loaf made by some baker who wishes to substitute that loaf for a pound loaf. He can puff it up and make it look as big as a pound loaf * * *; there is no question about it. You must have the weight on there if you are going to obtain the confidence of the consumer." Experience has proven the wisdom of his statement.

Section 10 of the law fixes the penalty for violating any part of the law as a fine "of not less than $10, nor more than $100, and each day's continuance of any practice, act or condition prohibited herein shall constitute a separate offense within the meaning of this act."

The last section has to do with the validity of the act and states "that if any clause, sentence, paragraph, or part of this act shall for any reason be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, or invalidate the remainder of this act."

In April, prior to the taking effect of the law on July 1, the food and drug commissioner sent a letter to the bakers interpreting the law and rulings of the State board of health. In this letter it

was stated that "in determining the weight of loaves of bread, variations at the rate of 1 ounce per pound over and 1 ounce per pound under the unit weights fixed by the statute are permitted in individual loaves, but the average weight of not less than 25 loaves of any one unit or of one kind shall not be less than the weight prescribed by law for such unit." It was further stated that "not less than 25 loaves of bread shall be weighed at the bakeshop where such loaves are produced not more than six hours after baking." It has been found necessary to deviate from this general policy in two respects: First, averaging of the weight is based upon the weight of less than 25 loaves when that number of loaves is not available; second, bread is not always weighed upon the premises where baked, nor within six hours after baking.

The question had arisen of the use of old stocks of wrappers on hand on the date when the law would become effective. In this connection the commissioner stated "that in the case of wrappers purchased prior to April 1 which do not state the weight of the loaf, a label showing such weight and the name of the baker must be affixed to the wrapper or to the loaf." It was found necessary to withdraw this privilege about six months after the law became effective. However, in cases in which considerable stocks of old wrappers still remained, suitable arrangements for their disposal were made. Care was exercised at all times to enforce the provisions of the act in a reasonable manner and to refrain from a too technical interpretation of the law until the bakers could adjust their business and shop practices.

As to the success and satisfactoriness of the enforcement of the bakery law and the good which it has done, I believe the opinion of the bakers of the State, in so far as it can be determined, is of more value in arriving at a conclusion than any statement from me. I shall, therefore, attempt to give this opinion so far as it is reflected in letters, public utterances, resolutions, and reports.

The president of the Indiana Bakers Association, in his opening address at their convention in January, 1920, about six months after the law became effective, spoke as follows: "When the housewife buys a loaf of bread in Indiana she knows exactly what she is paying for. Her bread costs so much a pound, just as her butter, her meat, and her sugar. She has a fair known buying basis. * * * We made the law based on our best knowledge. Let us live up to it and give it a thorough test."

The secretary of the State Bakers Association made a survey between July and October of 1920 in which he visited 90 towns and called at 411 bakeries. Among other subjects which he discussed with the bakers was their attitude toward the new bakery law after about one year's operation. Three hundred and sixty-six bakers favored the law and its enforcement; 16 expressed no opinion; 9 were not at home; 6 were opposed to the standard weight section, while 1 objected to any form of regulation.

The Indiana Bakers Association at its meeting in January, 1922, adopted the following resolution:

Resolved, That the members of the Indiana association are fully satisfied with the operation of our standard bread weight law of Indiana in every respect, and are ourselves convinced that all the other States would do well to

adopt the same law; however, as doubt seems to exist in certain sections as to the advisability of a strictly standard weight law, and as a concerted effort is being made to write into the law of certain States a bread-weight provision based on recognizing fractional units and ounces, rather than the standard pound weight that we have found beneficial to the industry when in actual operation; therefore, we believe it advisable at this time that those sections not in accord with the principles of standard weights try out the other theory of fractional units, assuring them of our friendly interest, and still reserving for their use our help and experience in event that their experiment fails to answer the purpose they seek.

This resolution not only shows the faith of the bakers in the law which they had been so instrumental in making, but a broadmindedness on their part and an interest in other bread-weight legislation differing radically from that under which they were working.

The attitude of the bakers of the State is further indicated by a questionnaire submitted to 200 bakers by their secretary, when an amendment was submitted in the legislative session of 1923 to repeal the bakery goods "exchange" section of the law. In response to the questionnaire, 125 replies were received; 114 stated specifically that they were opposed to the repeal of this section; 7 favored the repeal, while 1 was opposed to all provisions of the bakery law.

When requested to discuss this subject I addressed a letter with the following inquiries to 25 bakers in every part of the State, ranging from the small retail baker to the largest wholesaler, some members, others nonmembers of the State association:

1. What do you regard as the advantages or disadvantages, to both the baker and the consumer, of the standard weight loaf provision?

2. In your opinion, does the compliance with the tolerance of "1 ounce per pound above or 1 ounce per pound below the standard weight unit" place an undue hardship upon the baker?

3. In your opinion should this section (section 9) be changed or amended in any manner?

To the time of writing this paper 15 replies had been received. Considering the replies to the questions in inverse order, 11 were opposed to any amendment of the present standard bread-weight section; 3 expressed no opinion; 1 favored the elimination of the 12-ounce loaf; 14 were in favor of the present tolerances of 1 ounce per pound above or 1 ounce per pound below the standard weight; 1 expressed no opinion.

The following advantages to the baker were mentioned in replies to the first question: The standard-weight loaf makes it easier to maintain quality; makes it possible to standardize pans and equipment; creates fair competition; standardizes and simplifies shop practice, including the calculation of dough batches, scaling, care of equipment, etc.; prevents "shading" the weight of the loaf in order to reduce the price; influences quality and thus to an extent standardizes prices; simplifies cost finding.

Advantages to the consumer were enumerated as follows: The standard-weight loaf guarantees quantity, discourages fraud through the "puffing" of the loaf, protects the uninformed consumer by furnishing him accurate information, and tends to insure better quality.

No disadvantages to the consumer were mentioned and but two to the baker, namely, the difficulty of adjusting bread prices to meet

fluctuating costs of materials and costs of manufacture, and, second, the inconvenience experienced in baking smaller or larger loaves for sale outside the State.

These letters contained some very interesting comments from the bakers which I believe are worth quoting. In reference to tolerances: "The tolerance of 1 ounce per pound above or 1 ounce per pound below the standard weight unit is not a hardship nor is it unfair in this day of modern machinery." "In my opinion the tolerance of 1 ounce per pound above or 1 ounce per pound below, does not work a hardship upon the baker. I think we would be making a grave mistake if we should change this weight law in any way whatsoever." "I think the clause permitting a variance of 1 ounce above or below the standard weight is necessary and places no hardship upon the baker." "The tolerance clause in this law does not give us any trouble and I don't see why it should be changed or amended in any way."

One baker says, in speaking of the disadvantages of standard bread weights, "The disadvantage of price change is one in name only as we have not found it difficult, when conditions warranted, in making a price change. * * * We consider this disadvantage of little moment."

An experienced baker doing a moderate-sized business writes, "I would say this law is highly satisfactory with the bakers of Indiana. I have not heard of a single violation of the 1 ounce per pound tolerance where 25 pounds was taken as a basis for calculation. It standardizes the size of the loaf and makes quality the basis of competition instead of volume. * * * It also enables the public to know what it is getting in the way of value and does not encourage the making of a light 'puffy' loaf of little substance in order to deceive the eye. It eliminates the frequent discarding of good pans in order to copy a popular loaf or change of size on account of fluctuating costs." Another baker says, "It further puts the bakers on an equal basis of manufacturing bread, and the sizes of the loaf adopted are not only the best from point of view of the sales price, but they are best from point of view of manufacturing. The standard sizes provided give us about the units that are most satisfactorily baked." Another baker in a territory where competition is keen and quality has not always been the first consideration writes, "We believe that one of the main reasons why much better bread is being baked to-day [in Indiana] by the average baker is traceable to this law."

The following paragraph from one of the letters seems to summarize the general feeling of the bakers who replied to my inquiries: "We believe that the standard weight law governing the weight of bread is advantageous to both baker and consumer. It stabilizes competition for the baker and guarantees the consumer a unit in purchasing food. Almost every other commodity is sold by some definite weight or measure, but bread before the enactment of the weight law was variable, varying almost constantly according to competition. We certainly would not like to see the repeal of the standard weight law." Judging from the evidence available and from observation extending over nearly five years of enforcing the law, Indiana bakers favor very strongly standard unit weights for

the loaf, a tolerance in excess that will necessitate the baking of a truly standard loaf, the labeling of the loaf with the weight and baker's name, and the prohibition of the baking of loaves of weights other than the standard weights, even though plainly labeled.

The majority of officials who have had experience in the enforcement of any form of bread-weight law or ordinance will agree that these are essential features if effective regulation is accomplished. A definite standard weight furnishes a fixed basis upon which both the official and baker can work; a too liberal tolerance in excess defeats the purpose of regulation by permitting the baking of a loaf of a smaller standard unit to resemble in volume a loaf of a larger standard unit; labeling the loaf with the weight and baker's name fixes responsibility; baking of loaves of other than the standard weights enables the baker who is so inclined to offer numerous alibis regarding mistakes in labels, compliance with tolerances, etc., that make successful prosecution practically impossible.

From the standpoint of the official, the enforcement of the bread-weight section of the Indiana law has been reasonably satisfactory. In my opinion the provisions of this section are as nearly universally observed as any regulative law in the State. Strong-arm methods have not been used. Compliance has usually been secured through explanations of the law and warnings, the courts being used as the last resort.

Nineteen prosecutions have been instituted under the bread-weight section during the nearly five years the law has been in force. Two of these prosecutions were brought for the sale of bread short in weight, while 17 were undertaken because of failure, after proper warning, to label the loaf with the weight and the name of the baker. Convictions were obtained in each case. Seventy-two formal written notices have been issued to bakers who have been slow to observe the labeling provisions.

The Indiana law is truly a bakers' law. The bill was prepared by them in cooperation with the food and weights and measures officials and enacted largely through their efforts. The satisfactory enforcement of the law has been due as much to them as to any other agency. The more than 800 bakers of the State have largely policed their industry with the result that infractions of all features of the law have been comparatively few. It is difficult for us in Indiana to realize or understand the cause for the marked differences of opinion that exist in some States. Opposition to bread-weight laws, I think, is as much due to psychological causes as to any other, the difficulty of changing from the old to the new.

The baker must realize that there is demand for bread-weight legislation and that he must finally submit to some form of bread-weight control. On the other hand, the control official must bear in mind that certain rights of the industry must be respected, and that there are difficulties in adjusting trade practices, which have been in vogue so many years, to such regulation. Both must understand that any law that merely substitutes a new set of evils for those already existing will result in disappointment and loss to the baker and dissatisfaction and criticism for the official.

State legislatures and city councils will continue to pass bread-weight laws; it is the job of the bakers and officials to see that

these laws are so written that they will advance the interests of the industry and fully protect the consumer.

The CHAIRMAN. You will note, gentlemen, that provision is made later for the discussion of these papers on bread laws.

INTERSTATE STATUS OF PACKAGE GOODS

By J. B. HORIGAN, *Office of Solicitor, U. S. Department of Agriculture*

In its legal aspects the subject of this paper is quite relevant in the consideration by this conference of standard bread legislation, in view of the fact that attention has been directed both to State and prospective Federal legislation on the subject of the standardization of bread loaves, in particular the Nebraska bread law recently declared unconstitutional by the Supreme Court, and the Brand bill now pending in Congress for the standardization of bread loaves shipped in interstate commerce.

Discussion of the status of interstate food packages, including bread, involves the consideration of the interrelation of the commerce clause of the Federal Constitution and the sovereign power of the State to pass regulations for the health and safety of its citizens, for the protection of their property and for the suppression of frauds, which are commonly referred to as police laws. This field of judicial inquiry and interpretation is covered by many decisions by the Supreme Court. The broad governing principles thereof are quite clear, but their application to particular types of legislation in concrete cases frequently presents difficulties that require careful distinctions to be made.

As regards the respective spheres of Federal and State action, the principles derived from the decisions of the Supreme Court may be briefly recapitulated thus: The States have plenary power to regulate the manufacture and sale of articles within their borders and the scope of the regulation is solely confided to the State, subject to the qualifications of the fourteenth amendment that the legislation be not so arbitrary as to amount to a deprivation of property without due process of law, nor so discriminatory as to be tantamount to a denial of the equal protection of the laws.

Under its police power it is for the State exclusively to decide with reference to the manufacture and sale of articles produced and consumed within the State, and the States may even prevent the shipment in interstate commerce of articles which their public policy regards as unfit or improper to be shipped beyond the State limits. Thus the Supreme Court in Sligh *v.* Kirkwood, 237 U. S. 52, decided that Florida might validly prohibit the shipment of immature citrus fruit to another State. Moreover, Congress may not, under the guise of regulating interstate commerce, undertake to regulate the manufacture or production of commodities within the State. This was decided recently in the case of Hammer *v.* Dagenhart, 247 U. S. 251, declaring the first Federal child labor law unconstitutional as an invalid attempt by Congress to encroach upon the police power of a State. And later the Supreme Court decided the second Federal child labor law, which was based upon the taxing power of Congress, was also unconstitutional, as a like invasion of State rights.

When we come to the realm of interstate commerce it is well established that the sending of a food article or other commodity from one State to another, there to be sold in its original unbroken package, is an interstate transaction and subject to be regulated by Congress in the exercise of its constitutional power over interstate commerce. Such regulations are paramount to any State police regulation touching the subject. The Federal regulation covers an article in interstate commerce not only while being actually transported, but persists until the goods have been so acted upon by the importer as to be commingled with the property of the State. The point when the goods have ceased to be in interstate commerce has not been expressly defined, but decisions of the courts have indicated that the limits set forth in section 10 of the food and drugs act of June 30, 1906 (34 Stat., 768) constitute for practical purposes the boundary between inter and intrastate commerce; that is to say, goods are in interstate commerce so long as they remain unloaded, unsold, or in the original unbroken package. It was early determined in Brown *v.* Maryland, 25 U. S. 419, that the right to import goods in foreign commerce carried with it the right of the importer to make one sale of the article in its package of importation for the reason that this was the object of its importation. The same holding was made with reference to packages passing from one State to another in Vance *v.* Vandercook, 170 U. S. 438. In this connection, however, the qualification must be observed that where an article has been introduced in interstate commerce in violation of a law of Congress, the article may properly be pursued and condemned wherever found as a contraband of interstate commerce irrespective of the fact that its interstate character had been lost. Hipolite Egg Co., *v.* U. S., 220 U. S. 45; McDermott *v.* Wisconsin, 228 U. S. 115.

While the authority of Congress over articles in interstate commerce is paramount and it necessarily follows that Federal regulations, in case of conflict, must prevail over the incidental police regulations permitted to the States, yet this does not mean that a State is absolutely prohibited from making a regulation concerning an interstate package of food. Long ago in the case of oleomargarine the right of a State to enact legislation which would prevent fraud or deception upon its citizens was upheld in the case of Plumley *v.* Massachusetts, 155 U. S. 462, which prohibited the sale of oleomargarine in a State in such a way as to be misleading and deceptive. The reasoning of that case has been applied in a number of instances to State statutes alleged to be in conflict with the Constitution and has only been qualified to the extent that a State might not in the exercise of its police power lay a direct burden upon interstate commerce or so legislate as to absolutely prohibit a healthful article which was legitimate in commerce from being introduced into a State, Schollenberger *v.* U. S., 171 U. S. 1, nor indirectly prohibit a healthful article from being introduced into a State by requiring, as did a New Hampshire statute, construed in Collins *v.* New Hampshire, 171 U. S. 30, that oleomargarine be colored pink. The cases, however, seem to support the reasonable exercise by the State of its sovereign police power upon articles introduced from another State on the theory, applicable to the case of short-weight bread, that the right to conduct interstate commerce without burdensome legislation

by the State does not secure to anyone the right to defraud or to deceive the citizens of another State nor to ship into a State articles or commodities which are dangerous to the health or to the property of the citizens of the State of destination; and as said by the Supreme Court in the case of Patapsco Guano Co. *v.* North Carolina, 171 U. S. 345, 357, 358:

> Whenever inspection laws act on the subject before it becomes an article of commerce they are confessedly valid, and also when, although operating on articles brought from one State into another, they provide for inspection in the exercise of that power of self-protection commonly called the police power.

And again referring to the decision in Plumley *v.* Massachusetts:

> Where the subject is of wide importance to the community, the consequences of fraudulent practices generally injurious, and the suppression of such frauds matter of public concern, it is within the protective power of the State to intervene. Laws providing for the inspection and grading of flour, the inspection and regulation of weights and measures, the weighing of coal on public scales, and the like, are all competent exercises of that power, and it is not perceived why the prevention of deception in the adulteration of fertilizers does not fall within its scope.

With reference to the interrelation of State and Federal food laws the Supreme Court has, in effect, applied the foregoing principles. In Savage *v.* Jones, State chemist of Indiana, 225 U. S. 501, and the Standard Stock Food Co. *v.* Wright, State food and dairy commissioner of Iowa, 225 U. S. 540, State statutes subjecting stock feed to labeling requirements supplemental to the labeling requirements of the Federal food and drugs act were upheld as valid by the Supreme Court against the allegation that they conflicted with the interstate regulations of Congress governing these articles. In Armour *v.* North Dakota, 240 U. S. 510, the Supreme Court held the State statute requiring lard not sold in bulk to be put up in pails or other containers holding a specified number of pounds net weight or even multiples thereof, was not unconstitutional and not in conflict with the food and drugs act. The State law was there construed as applying only to the retail sales. In Hebe *v.* Shaw, 248 U. S. 297, the State law of Ohio against condensed skim milk was upheld. It forbade the retail sales of a compound of vegetable oil and skim milk even though properly labeled and legitimate under the Federal food and drugs act. In Weigle *v.* Curtis Bros., 248 U. S. 285, the State law of Wisconsin prohibiting the sale of foods containing benzoic acid or benzoate of soda was upheld as not being in conflict with the Federal food and drugs act which permitted the use of this preservative in foods. In Corn Products Refining Co. *v.* Eddy, 249 U. S. 427, a State regulation of Kansas respecting the labeling of sirup compounds and requiring compound sirups to state definitely on the principal label the percentage of each of the ingredients thereof was held not in conflict with the commerce clause of the Constitution nor repugnant to the Federal food and drugs act.

An example, however, of State legislation which did conflict with the Federal food and drugs act is illustrated by the case of McDermott *v.* Wisconsin, 228 U. S. 115, wherein it was held that a State statute of Wisconsin which required a product containing corn sirup mixed with glucose to bear the label required by the State law and no other, was invalid. The labeling prescribed by the State statute required the ingredients, which the Federal regulations permitted to

be called corn sirup, to be designated glucose. The statute was declared invalid for the reason that the label which was on the retail cans was the means whereby compliance with the requirements of the Federal food and drugs act must be ascertained. As expressed by the court, it was said that the labeling of the article was the means of vindication of the lawfulness of the shipment or the means of punishment of the shipper; that the State law was invalid in that it defeated the right of Federal inspection while the goods were unsold in the hands of the original consignee.

The foregoing cases furnish a background for considering the legal aspects of any bread-standard legislation. It is believed that in application these principles would allow a fair field of operation for both State and Federal legislation upon the subject. In so far as bread in packages is now concerned, it is subject to the net-weight requirements of the Federal food and drugs act which, in substance, are that food in package form must bear a true declaration of the quantity of contents in terms of weight, measure, or numerical count, with an allowance for reasonable variations and tolerances.

It is competent for Congress to supersede this existing legislation by more specific and effective legislation which would have the same object in view, namely, to prevent fraud or deceit upon the consumer as to the weight or quantity of bread purchased. Such legislation could be made to operate within the same limits as the present food and drugs act; that is, on the article while it remained unloaded, unsold, or in the original unbroken package; or Congress, if it saw fit, could in such legislation provide that bread upon entering the State might be subject to the said legislation even while technically in interstate commerce; that is, unloaded, unsold, and in the hands of the original consignee, or in the original unbroken package; but the congressional legislation on this point would have to be very definite and specific, as in the case of the Wilson law declared constitutional in the case of *In re* Rahrer, 140 U. S. 545, and in the Webb-Kenyon Act upheld in Clark Distilling Co. *v.* Western Maryland Railroad, 242 U. S. 311. It is important to note in this connection that if the State legislation prescribing a standard loaf is intended to operate upon other than retail sales of the loaf, the conditions must obtain that the legislation be reasonable and not lay a direct burden upon interstate commerce in the article, and it must not be in conflict with any legislation of Congress upon the subject. Meeting these conditions, the State legislation would possibly be upheld upon the same theory that animal quarantine laws were upheld in the cases of Reid *v.* Colorado, 187 U. S. 137, and Aswell *v.* Kansas, 209 U. S. 251, where State and Federal legislation upon the same subject were construed as permitting a fair field of operation for both statutes without conflict. In Reid *v.* Colorado the court held:

> It should never be held that Congress intends to supersede or by its legislation suspend the exercise of the police powers of the States, even when it may do so, unless its purpose to effect that result is clearly manifested. This court has said—and the principle has been often reaffirmed—that "in the application of this principle of supremacy of an act of Congress in a case where the State law is but the exercise of a reserved power, the repugnance or conflict should be direct and positive, so that the two acts could not be reconciled or consistently stand together."

In this connection the suggestion occurs that the most certain and preferable method of preventing conflict between Federal and State standard-bread legislation would be to incorporate a suitable provision in any prospective Federal legislation upon the subject which in clear and positive terms would insure the free operation of the State law at destination upon bread introduced from another State.

Viewed from a practical standpoint, it would seem expedient that Federal and State legislation in respect to package food in commerce should be made to harmonize all along the line, so as to bring about a complete and uniform system of regulation, which would simplify and make certain the legal requirements for a standard package. Such a system would tend to the common advantage of both seller and consumer.

THE RECENT DECISION OF THE UNITED STATES SUPREME COURT ON NEBRASKA BREAD LAW

By F. S. Holbrook, *Bureau of Standards*

A little more than a month ago the Supreme Court of the United States handed down a decision of the utmost importance to weights and measures officials, to the bread industry, and to the consumers of this commodity throughout the United States. At first it was believed that a veritable bombshell had been exploded in the ranks of the advocates of standard-weight bread legislation, and for a short time extreme pessimism reigned among them. It was thought by many of them that the work which had been carried on for years by the weights and measures officials and by one of the groups of the baking industry had in a trice been nullified; that they had spent their time and energy unavailingly; and that their sincere efforts to better the bread situation had come to naught. This feeling was the result, we believe, of their belief that the principle of standard-weight bread legislation had been declared unconstitutional by the court of last resort in the United States. It was based on the fragmentary and, perhaps, somewhat misleading press dispatches sent out in reference to the decision.

Some there were who did not take so dark a view of the situation. Having in mind the case of Schmidinger *v.* Chicago, in which the standard-weight bread ordinance of that city had been upheld by the same court a number of years ago, these more optimistic men were content to abide their time in patience; to wait until the full decision of the court was available, and until it had become possible carefully to analyze its language; to reserve judgment until the smoke had been cleared away, a careful check of the casualties made, and the new alignment of the opposing forces disclosed by careful scrutiny of the entire field.

It seems that a sufficient time has now elapsed to make possible this analysis of the situation, to make preparations to rectify mistakes, if any, made in the past, to re-form the lines of the advocates of standard-weight legislation, and to inaugurate a new campaign planned on the sound basis of the recent decision on the subject. It seems that this decision has cleared the air, has given us a better understanding both of our powers and our limitations, and that we

can now go ahead feeling confident that whatever progress we make in the future will be actual advancement without danger of trespassing upon limitations set up by the Constitution.

The Nebraska bread law, which was the subject of the litigation, read in part as follows:

SECTION 2. Bread, standards of weight. Every loaf of bread made or procured for the purpose of sale, sold, exposed or offered for sale in the State of Nebraska shall be the following weights avoirdupois, one-half pound, one pound, one and one-half pounds, and also in exact multiples of one pound and of no other weights. * * * Whenever twin or multiple loaves are baked, the weights herein specified shall apply to each unit of the twin or multiple loaf.

SECTION 3. Tolerance, how determined. A tolerance at the rate of two ounces per pound in excess of the standard weights herein fixed shall be allowed and no more, provided that the standard weights herein prescribed shall be determined by averaging the weight of not less than twenty-five loaves of any one unit and such average shall not be less than the minimum nor more than the maximum prescribed by this act. All weights shall be determined on the premises where bread is manufactured or baked, and shall apply for a period of at least 24 hours after baking: *Provided*, That bread shipped into this State shall be weighed where sold or exposed for sale.

The proceedings in which we are interested originated on July 12, 1921, in the District Court of Lancaster County, Nebr., at the instance of the Jay Burns Baking Co., Peterson & Pegan Baking Co., Federal System of Bakeries of Omaha, Chas. W. Ortman, and James D. Pettys, "for themselves and all others interested." The case took the form of a bill in equity for an injunction against the Governor and the secretary of the department of agriculture of the State of Nebraska to prohibit these officials from enforcing the bread law set out above. Please keep in mind the form of the action, since we will later take occasion to say a few words in relation to this.

The lower court decided that the act was constitutional. Upon appeal to the Supreme Court of the State of Nebraska a similar conclusion was reached. The brief presented to this court by the attorney general contended that the law was concerned with weights only, that the tolerances allowed were reasonable ones, and that the fixing of maximum weights was a reasonable and necessary regulation. The Supreme Court of Nebraska said in relation to this:

It is to prevent a loaf of one standard from being increased in size until it can be readily sold for a loaf of a larger standard that a maximum weight is fixed. The test is reasonableness. * * * The statutory margin or tolerance being 2 ounces to the pound, can bakers, for example, make a loaf 18 ounces in weight that will weigh not less than 16 ounces 24 hours after it is baked? The tests and proofs on behalf of the State tend to show that the regulation is reasonable and can be observed at all times. It is fairly inferable from the evidence adduced by plaintiffs that compliance with the regulation is practicable most of the time, but that, tested by their experiments as made, there are periods when the operation of natural laws will prevent compliance with legislative requirements. There are a number of reasons, however, why the tests made to prove unreasonableness should not be accepted as conclusive. If correctly understood, these tests were made with bread manufactured in the regular course of business, without any attempt to change ingredients or processes or to retard evaporation of moisture in loaves by the use of wax paper or other means. * * * The act of the legislature does not fix prices but leaves bakers free to make reasonable charges for bread wrapped in inexpensive wax paper for its preservation in transportation and in the markets. * * * Precautions to retard evaporation of moisture in bread for the purpose of keeping it in a good state of preservation for 24 hours may be required as an incidental result of a police regulation establishing standards of maximum weights for

loaves of bread. Palatableness, a quality demanded by the public, is affected by excessive evaporation, if food value is not. * * * The evidence does not prove that, if reasonable means or precautions are taken by plaintiffs and other bakers to retard evaporation, they cannot comply with the act of the legislature, or that the regulation is unreasonable.

Following this decision in the Nebraska Supreme Court the case was appealed to the Supreme Court of the United States.

In order that those of you who may not have had, as yet, an opportunity of reading the decision of the Supreme Court may gain a general idea of its scope, it seems that throughout this paper the more vital parts may well be quoted as occasion requires.

The case is then, No. 94, October term, 1923, and the decision was handed down April 14, 1924. It is known as Jay Burns Baking Co. et al., plaintiffs in error, *v.* Chas. W. Bryan, as governor of the State of Nebraska et al. The majority decision was delivered by Mr. Justice Butler. Two members of the court, Mr. Justice Brandeis and Mr. Justice Holmes, dissented, the former delivering the minority opinion.

In the majority opinion, the law which has been read is first summarized and the plaintiffs and defendants described. The court then quoted the extracts from the Nebraska decision, which have been given above, and proceeds as follows:

Undoubtedly, the police power of the State may be exerted to protect purchasers from imposition by sale of short-weight loaves. Schmidinger *v.* Chicago, 226 U. S. 578, 588. Many laws have been passed for that purpose. But a State may not, under the guise of protecting the public, arbitrarily interfere with private business or prohibit lawful occupations or impose unreasonable and unnecessary restrictions upon them. Lawton *v.* Steele, 152 U. S. 133, 137; Meyer *v.* Nebraska, 262 U. S. 390, 399. Constitutional protection having been invoked, it is the duty of the court to determine whether the challenged provision has reasonable relation to the protection of purchasers of bread against fraud by short weights and really tends to accomplish the purpose for which it was enacted. Meyer *v.* Nebraska, supra; Welch *v.* Swasey, 214 U. S. 91, 105; Dobbins *v.* Los Angeles, 195 U. S. 223, 236; Connolly *v.* Union Sewer Pipe Co., 184 U. S. 540, 556; Lawton *v.* Steele, supra.

The loaf is the usual form in which bread is sold. The act does not make it unlawful to sell individual loaves weighing more or less than the standard weights, respectively. Loaves of any weight may be sold without violation of the act, if the average weight of not less than 25 does not exceed the permitted maximum or fall short of the specified nominal weights during 24 hours after baking. * * * Plaintiffs in error do not claim that it is impossible to make loaves which for at least 24 hours after baking will weigh not less than the specified minimum weights, but they insist that the difference permitted by the act between the weight of loaves when taken from the oven and their weight 24 hours later is too small, and that it is impossible for bakers to carry on their business without sometimes exceeding the maximum or falling short of the minimum average weights.

Much evidence was introduced by the opposing parties bearing upon the question as to whether it was possible for the bakers to comply with the law. Much of this was devoted to the question of shrinkage. The defendant's evidence seemed to show that the tolerances allowed by the law were ample. Some of the plaintiff's evidence was to the contrary effect. It is a most remarkable fact that figures indicating shrinkages of as much as 3¾ to 4¼ ounces in 24 hours, on individual loaves weighing about a pound, were exhibited. The temperature and humidity of the air in these cases of excessive shrinkage were not shown, but the notation is made that it was "dry." Doubtless it was—very dry.

In this relation I might say that the Bureau of Standards has conducted shrinkage experiments on loaves of bread commercially baked and kept in the ordinary way and has never found shrinkages at all comparable to shrinkages such as these. Our experiments are all to the effect that the range in the Nebraska law is an ample one. Figures published by other investigators are to the same effect.

However, the Supreme Court considered the figures, discussed the factors causing unavoidable variations in the weights of loaves, and draws this conclusion from this consideration:

* * * the evidence clearly establishes that there are periods when evapora tion under ordinary conditions of temperature and humidity prevailing in Nebraska exceed the prescribed tolerance and make it impossible to comply with the law without wrapping the loaves or employing other artificial means to prevent or retard evaporation. And the evidence indicates that these periods are of such frequency and duration that the enforcement of the penalties prescribed for violations would be an intolerable burden upon bakers of bread for sale.

Continuing, the court says that the fact that bread baked of other ingredients, or bread which was wrapped, could be made to comply is not of importance. It is not incumbent upon bakers so to make or wrap their bread in order to obtain loaves complying with the law, since this is to be considered unreasonable, the act not being a sanitary measure.

The court then sums up and concludes in the following words:

No question is presented as to the power of the State to make regulations safeguarding or affecting the qualities of bread. Concretely, the sole purpose of fixing the maximum weights, as held by the Supreme Court, is to prevent the sale of a loaf weighing anything over 9 ounces for a 1 pound loaf, and the sale of a loaf weighing anything over 18 ounces for a pound and a half loaf and so on. The permitted tolerance, as to the half pound loaf, gives the baker the benefit of only 1 ounce out of the spread of 8 ounces, and as to the pound loaf the benefit of only 2 ounces out of a like spread. There is no evidence in support of the thought that purchasers have been or are likely to be induced to take a 9½ or a 10 ounce loaf for a pound (16 ounce) loaf, or an 18½ or a 19 ounce loaf for a pound and a half (24 ounce) loaf; and it is contrary to common experience and unreasonable to assume that there could be any danger of such deception. Imposition through short weights readily could have been dealt with in a direct and effective way. For the reasons stated, we conclude that the provision, that the average weights shall not exceed the maximums fixed, is not necessary for the protection of purchasers against imposition and fraud by short weights and is not calculated to effectuate that purpose, and that it subjects bakers and sellers of bread to restrictions which are essentially unreasonable and arbitrary, and is therefore repugnant to the fourteenth amendment. Judgment reversed.

So much then for the text of the decision.

The first general conclusion which is to be drawn from the decision is that it does not reverse the conclusions reached in the case of Schmidinger *v.* Chicago, 226 U. S. 578, since this is cited with approval; nor, in general, does it in any way controvert the principle that the States have the power to regulate the sale of bread. Moreover the power of the States to require that bread be made and sold in standard-weight loaves, and in no other way, is specifically affirmed. It seems that if there is one fact which is an outstanding one in the decision it is this one. The decision, far from breaking down the principle of standard weights, results only in buttressing it. Certainly to this extent it is one that will be welcomed by weights and measures officials.

On this point the Supreme Court says:

> Plaintiffs in error do not question the power of the State to enact and enforce laws calculated to prevent the sale of loaves of bread of less than the purported weight * * *
>
> Undoubtedly, the police power of the State may be exerted to protect purchasers from imposition by sale of short-weight loaves.

From the above it is concluded that we may continue to write and enact standard-weight bread laws. A little later the question will be discussed: How should we frame them that they may be free from constitutional objection?

A second general conclusion of very great importance is that it does not appear by any means that all of the standard-weight bread legislation now on the statute books is unconstitutional. Apparently the Supreme Court had in mind only the specific provisions of the Nebraska statute and the results which would follow the enforcement of them in that particular State.

This seems to be indicated by the language:

> For the reasons stated we conclude that the provision, that the average weights shall not exceed the maximums fixed * * *.

Obviously only the particular maximums mentioned in this particular law are here referred to; and again, conditions in Nebraska are stressed in the language:

> * * * the evidence clearly establishes that there are periods when evaporation under ordinary conditions of temperature and humidity prevailing in Nebraska exceed the prescribed tolerance and make it impossible to comply with the law * * *.

Again it seems obvious that the decision is limited to apply only to that State.

In this paper we have purposely refrained from discussing the probable effect of this decision on other specific bread laws now on the statute books of various States. The suggestions hereinafter made are to be construed to refer to the form in which proposed future enactments might well be drafted in order surely to avoid danger of unconstitutionality. We would not have you conclude, however, that it is our thought that are these principles not embodied in any present law, such law is necessarily unconstitutional. Not at all. An estimate of the effect of this decision on the laws of other States can reasonably be arrived at in each particular case only after a careful analysis of all the provisions of the law in question and of any surrounding circumstances of importance. It is true that it is hoped that the suggestions herein will be found helpful as a guide in this analysis, and if they prove to be of use in this connection we will be wholly satisfied. Fortunately several of the provisions of the Nebraska law are not usual ones and are, perhaps, not embodied in any other State law on the subject of bread.

It is a gratifying fact that there is apparently no general desire on the part of the industry to overturn the standard-weight law in other States. Bakers, in general, are apparently satisfied to maintain conditions in "status quo," which serves as a complete refutation of the somber pictures which are painted by that group in the industry which so bitterly assails proposals for legislation of this character. If this present amiable attitude persists, it appears that

the Nebraska decision will have little or no effect on the enforcement of similar legislation now on the statute books of other jurisdictions.

In considering the decision in general, it seems that we are bound to arrive at the conclusion that it hinges almost exclusively on the question of numerical tolerances. Again, the vital question is the range of these tolerances—the total allowance embraced between the maximum and minimum values specified. Nothing in the decision can be so read as to condemn the fixing of a very small tolerance or even no tolerance whatever, in deficiency. Even the Nebraska law itself, which allows no tolerance in deficiency on loaves of bread for a period of 24 hours after baking, was not found objectionable so far as this provision is concerned. If no limitation is placed on the maximum weight of the loaves—if tolerances in excess are not specified—no difficulty in respect to tolerances is apprehended.

It is believed, moreover, that we need not necessarily go to this extreme, since nothing in the decision appears to prohibit the specifying of maximum weights or the fixing of tolerances in excess, provided only that the values fixed are not so small as to fall within the objection that they are essentially unreasonable and arbitrary. This conclusion is largely based on the language which we have already taken occasion to point out, that the court apparently objected only to the particular "values fixed" in the specific law in question.

Granting that we are not prohibited from the fixing of reasonable tolerances in excess, should we not continue to do so?

It surely seems that we should not desert this principle and that we would be acting inadvisedly were we to discontinue entirely the principle of fixing tolerances in excess. This principle was adopted with a very good reason in mind; the action was based on experience demonstrating its necessity. To quote from the minority opinion of Mr. Justice Brandeis, which sums up these reasons in excellent fashion:

> Why did legislators, bent only on preventing short weights, prohibit, also, excessive weights? It was not from caprice or love of symmetry. It was because experience had taught consumers, honest dealers, and public officials charged with the duty of enforcing laws concerning weights and measures that, if short weights were to be prevented, the prohibition of excessive weights was an administrative necessity.

Without excess tolerances, standard weights are very difficult to obtain. Bread supposedly of one standard weight may be made so greatly overweight that it closely simulates in its appearance the next larger standard size, though still short of that size in weight. Then, in fact, whether marked or not, it will actually be sold in competition with this larger size, and thus to all intents and purposes it becomes a short-weight loaf of bread.

But if we are still to have tolerances in excess, it becomes important to decide what such tolerances in excess should be in order that they may be unobjectionable.

You will remember that in discussing the question of tolerances in excess the decision employs the following language:

> Concretely, the sole purpose of fixing the maximum weights, as held by the Supreme Court, is to prevent the sale of a loaf weighing anything over 9 ounces for a 1 pound loaf, and the sale of a loaf weighing anything over 18 ounces for a pound and a half loaf, and so on. The permitted tolerance, as to the half pound loaf, gives the baker the benefit of only 1 ounce out

of the spread of 8 ounces, and as to the pound loaf the benefit of only 2 ounces out of a like spread. There is no evidence in support of the thought that purchasers have been or are likely to be induced to take a 9½ or a 10 ounce loaf for a pound (16 ounce) loaf, or an 18½ or a 19 ounce loaf for a pound and a half (24 ounce) loaf; and it is contrary to common experience and unreasonable to assume that there could be any danger of such deception.

Now it appears that to the last sentence can be ascribed either of two different meanings; and, in fact, the decision actually has been interpreted in these two ways by persons reading it. One interpretation is that the court meant that there was no reason why the range of tolerances should be only 2 ounces on a pound loaf; that this range might more reasonably have been 2½ ounces or even 3 ounces, since 18½ or 19 ounce loaves of bread could not reasonably be considered as susceptible of being mistaken for a 1½-pound loaf. On the contrary, the court may have meant that there was no reason why the range of the tolerances should have been limited not only to 2 ounces, but even to 2½ or to 3 ounces on a pound loaf, since the 18½ or 19 ounce loaves which might result from such a tolerance would not be mistaken for 1½-pound loaves. Construing the decision in the first manner the minimum range might, perhaps, legally be 2½ ounces on a pound loaf. If the second interpretation is the correct one, the minimum range of tolerances must certainly be more than 3 ounces on a pound loaf. Following the same reasoning the tolerance on a one-half-pound loaf should be more than 2 ounces. Probably on the various standard loaves larger than the 1-pound size the tolerances might safely be somewhat less proportionally than the tolerance on the pound size.

Since there is doubt it seems that the second viewpoint should be accepted. If the tolerances incorporated in future laws are so small as again to invite attack we run a great risk of new litigation, with ensuing expense, loss of time and efficiency, and, perhaps, injunctions preventing immediate enforcement—with the possibility that at the end a new series of bread laws might be held unconstitutional to the discouragement of advocates of the standard-weight principle. On the contrary if we accept the second viewpoint of the meaning we occupy a very much stronger position and greatly discourage legal attacks upon the validity of the laws by indicating that such attempts bid fair to be unsuccessful ones.

Nor does there seem to be any good reason from the practical standpoint against liberal tolerances in excess. So long as the loaves are kept within such bounds that a loaf of one standard size may not readily be so made as to compete with one of the next larger size allowed, then the fact that the tolerances in excess granted by law are very liberal ones need cause no one any concern. It has been shown by experience that little or no difficulty is ordinarily encountered in complying with the tolerances now usually allowed by law or regulation. Despite the more liberal tolerances suggested for the future it seems certain that this present status of things will be but little changed, after all. Bakers can not afford to give away bread—it is not good business, and bakers are constantly becoming better business men—nor will they do so. Loaves produced under normal conditions will be very close to standard size, as at present, and it will soon be forgotten that liberal tolerances in excess are specified for those who desire to avail themselves of them.

One or two further suggestions in relation to the drafting of laws may be made here.

If the conclusion given heretofore is correct that insufficient tolerances are the basis of the objection to the law, it seems that standard-weight laws will generally be unobjectionable if no numerical tolerances are specified in the law itself. These may well be replaced by some such statement as "reasonable tolerances shall be allowed," with the further provision that these are to be fixed by the enforcing officer. In such case it seems practically certain that there can be no constitutional objection to the law itself on the ground of tolerances. The values so fixed by regulation might, it is true, be such that they could not be legally enforced, but in this case the action taken by the enforcing authority is the thing which must be attacked, and the law itself would surely be valid since, in terms, "reasonable" tolerances are granted by the legislature. The law would stand unimpaired; only the unreasonable regulation would be null and void under the decision. In case this course is adopted the above suggestions in relation to size of tolerances will, of course, still be applicable when regulations are being drafted or revised.

A second suggestion may be of value:

It is stated by the Supreme Court that under the provisions of the Nebraska law, in arriving at the average weight by computing the average of the weights of 25 loaves, any loaves might be specially selected for this purpose. In other words, a number of the lightest or the heaviest loaves found in weighing a greater number might be especially assembled. Were the provision to be that the loaves used in arriving at an average weight were to be taken at random, an entirely new aspect of affairs would be presented; a state of facts would then exist, which it seems has not been ruled upon in this case. For the court says:

> Any loaves of the same unit at any time on hand during 24 hours after baking may be selected to make up the 25 or more to be weighed in order to test compliance with the act. Therefore, if only a small percentage of the daily output of the loaves in large bakeries shall exceed the maximum when taken from the oven, or fall below the minimum weight within 24 hours, it will always be possible to make up lots of 25 or more loaves whose average weight will be above or below the prescribed limits.

It is inconceivable that an inspector would weigh a large number of loaves and pick out all the lightest or all the heaviest ones to establish a prosecution; nor should he be allowed to do so. By all means provide that when all the loaves available at the time and place of weighing exceed the number of loaves to be weighed, those weighed shall be taken at random.

In conclusion, let us again revert to a fact mentioned heretofore, that this case was brought in the form of injunction proceedings to prohibit the enforcement of the law. The objections raised were not that anyone had been injured in the manner set out in the complaint, but that he might be so injured; they were not that the State had proceeded to enforce the law in such a manner as to cause enormous losses, but that it might so proceed; they were not that loaves of bread made and sold commercially had shrunk to a certain degree, with a resulting prosecution of the baker manufacturing it, but that they might shrink, as set out in the evidence, with such a result; it

was not that an inspector had arbitrarily selected the 25 lightest or the 25 heaviest loaves of a day's production of bread in determining the average weight, but that he might so arbitrarily select them. It seems very probable that had the law not been attacked in injunction proceedings, and had it been enforced—as it doubtless would have been enforced—in a sane and reasonable manner, no appeal to the courts could have been had in defense against a prosecution of the character of many of those discussed in the evidence, because doubtless no prosecutions would ever have been brought upon such a state of facts as were conjured up. However, it surely must be granted that officials should not be given power by law arbitrarily to cause great injury to citizens, even though they might usually be trusted not to cause such injury. It would be unfair to require industry to continue to do business under circumstances such that they would be in continual danger of unfair prosecution. Therefore, our laws should be so framed as to be unobjectionable in this regard; and to the framing of such laws we should give our most profound consideration.

Our final suggestion is, then: So write your law that it will not be susceptible to attack by injunction; so that any method of enforcement of the law that can be adopted under its provisions will not be open to legal objection.

THE FEDERAL BREAD BILL

By Hon. Charles Brand, *Member of Congress, Seventh District, Ohio*

Mr. Chairman and gentlemen, I want to congratulate you upon these meetings you are holding in Washington, assembling here the weights and measures officials of the United States. I have been close enough to your work to realize the importance to the public of these meetings.

I am asked to talk to you about bread; and as neither you nor I have any time to waste, I will get down to business immediately. I have had some difficulty in arriving at any language to express under-weight bread. When I call it "short weight" I find the bakers criticize it; they do not like that term. I have never found a term that did exactly express what I have in mind, but at a convention not long ago in Cincinnati I met a baker who said "I am opposed to your ideas about bread. I like my bonus." I said "Bonus?" He said, "Yes, every month I can figure just what my bonus is and I am opposed to your bread law." So, perhaps, I had better use the word "bonus" since that word comes from the bakers, although it is not a very popular one; less popular now even than a month ago.

Since the decision of the Supreme Court a good deal of work has been done, and I want to give the Bureau of Standards a great deal of credit, and Mr. Holbrook deserves a great deal of credit. I will say that after that decision was handed down, we worked together assiduously on the subject of tolerances to be written so as not to conflict with the Supreme Court decision.

It seems customary on an occasion of this kind to have a written statement because what one says here is important, and I will conform. I want to say that most of what I will say came from you men. I am sorting it out and handing it back. I am under great

obligation to the weights and measures officials of the United States because I have made no request that you have not complied with, and I know that the work that you did was performed willingly and in many cases represented the expenditure of much time and effort.

Now I want to call your attention to the value of the ingredients in a loaf of bread that sells generally over the United States for 8 to 9 cents in loaves from 14 to 16 ounces. I find there is about 1½ cents worth of wheat in such a loaf of bread when it is full weight and when the wheat is converted into flour, the cost of the flour is about 2 cents when good grades are used. However, flour varies in quality and price from about $4.50 to $6 per barrel and 2 cents will pay for the good grades of flour.

As evidence of this I offer the reports of the bakeries of the United States Government supplying the Army. I have on file reports showing that pound loaves of bread have been produced in these Government bakeries during the past year as low as 1¾ cents per pound, and this includes not only the flour but all the other ingredients, but does not include labor costs. This bread is being sold at the Army camps and hospitals at 3 cents per pound loaf. I have eaten the bread and it is good quality.

I also have figures submitted to me by a baking company of New York, one of the large concerns of the United States, which show their figures covering the cost of a pound of bread to be 3.11 cents per pound, including all ingredients.

I think it is very important to have these figures—both the Government figures, which are all impartial, and the figures from a private industry.

For the city of Washington I have still another interesting set of figures: A big bakery here has contracted with the Navy Department for several months to furnish pound loaves of bread at 3.69 cents per pound, and is selling to the retail grocers at 8 cents what is said to be exactly the same bread. And the retailers are retailing it at 9 cents. There is a difference of 100 per cent between what the Navy Department and the retailers pay for what is said to be exactly the same bread. When anyone tells you that the bakers do not want to standardize their loaves of bread because as a result they might be forced to add one-half cent to the price and make undue profit, tell them what I have just told you now, that bread is being sold now at less than 4 cents and at 8 cents on the same day for the same bread by the same concern.

I find in New York City practically all the bread sold is short weight by 2 ounces, and that it is being sold on the basis of 8 cents for a 14-ounce loaf.

In Ohio, where we have a standard-weight law, 16-ounce bread is being sold at 8 cents. In Indiana, where the standard-weight law prevails, a 16-ounce loaf is being sold for 8 cents. So that Ohio and Indiana are getting 16 ounces of bread for the same price that the city of New York pays for 14 ounces.

Now this is not an exception to the rule, but the information I have leads me to believe that wherever there is no law requiring full-weight bread the consumers are paying just as much for a short-weight loaf as is paid for a full-weight loaf where a standard law prevails.

I believe that 11 States have real standard-weight laws, with teeth in them, and the balance of the States have not. It seems clear to me that if a legislature or a Congress can pass a law and give the public 2 ounces of bread in addition without additional cost to the consumer, that is a law that deserves very prompt attention.

In Ohio three years ago bread was being sold in loaves varying from 12 to 14 ounces in weight at 8 cents. At that time flour was exactly the same price that it is now. To-day these loaves weigh 16 ounces on account of the enactment of a standard-weight law, and the consumer secures the bread at the 8-cent price.

I would like to estimate for you now what the loss is over the United States to the consumers on account of short-weight bread, and I also want to estimate for you what the gain is by the bakers.

I have figures to show that if there is a loss to the consumer in New York City of 2 ounces of bread to the loaf, that means a loss of one-eighth of the weight and, therefore, one-eighth of the price, which amounts to 1 cent a loaf; and figuring this on the entire number of loaves consumed in a year in New York City we come to the astounding figure of a $10,000,000 loss in the city of New York alone.

In the city of Washington, D. C., I have the written statement from the superintendent of weights and measures to the effect that 2 ounces of bread would amount, in the city of Washington on the amount baked, to $907,000 per year. If you will carry out these calculations on the population of the United States, as compared with the city of Washington and the city of New York, you will find that the total loss in the United States, if all bread is 2 ounces short-weight, will amount to $200,000,000 a year. This is an astounding figure and is equivalent to all the money that Ohio spends on all forms of taxation—roads, schools, administration, and all. I have also gotten at it in another way. I have found how much flour the bakers use in making bread, and I get the same result.

However, that figure is more than the loss to the consumers in the United States because they now have in 11 States full-weight bread. I am inclined to estimate the actual loss in the United States at $100,000,000 to the consumers on account of the "bonus," or short-weight bread.

On the other hand, I am able to prove that the bakers do not gain this $100,000,000 by producing short-weight bread. I can't figure out where they make any gain at all, except in the lesser amount of materials that they use. I am inclined to think it costs them just as much for the overhead of their business, just as much for factory expenses, just as much for selling and delivery expense for a 14-ounce loaf of bread as for a 16-ounce loaf; and I am inclined to think that all they gain is the difference in the amount of materials that they buy each month, which represents only about a quarter of the selling price of the bread; and, therefore, I would say that bakers are receiving, instead of $100,000,000 "bonus," really only $25,000,000.

And now I make this point: That they are making the consumer lose a hundred millions' worth of bread a year—and, by the way, making the farmers lose on the sale of wheat and other ingredients—in order that they may save for themselves only about $25,000,000. To my mind this is utterly false economics, and I feel that it is your duty and mine to put a stop to it as quickly as possible.

There is one objection to the enactment of laws, and that is the expense entailed by the Government in administering such laws. I have studied this very closely relative to a standard-weight bread act and I find the expense of the administration of such a law is almost nothing. There are peculiar reasons for this. If you force one baker to put up full-weight bread, that baker at once insists upon his competitor putting up full-weight bread. If a salesman is selling full-weight bread and finds some competitor who is selling short-weight bread, it is an easy matter for him to take the business away from that competitor. This forces every baker to put up full-weight bread without very much difficulty on the part of the enforcing officer. In other words, if you start one baker to putting up full-weight bread, the others comply as a matter of competitive necessity.

The weight on the loaf is important because that apprises the consumer of what he is entitled to get, and also gives information to the retailer. There is no question in anybody's mind as to the proper weights when the weight is labeled on the loaf.

In January I introduced the Federal bread bill in Congress. I will say that I took this matter up with the Bureau of Standards and Doctor Burgess along in June, and that we have worked on this problem more or less ever since. It has had its hearings before the Committee on Agriculture, and I want to give you a picture of what developed there. We had before us representatives from all the consumers of the United States. There were four or five women's associations that are of national importance; there were the American farm bureaus; there was the National Grange of America; there were representatives from the American Federation of Labor, and from all four of the railway federations. Also the Department of Agriculture and the Department of Commerce were represented. I think the above organizations probably represent fairly all the consumers of the United States, and there was not a dissenting voice amongst all those witnesses as to favoring full-weight bread.

When the bakers were heard on their side, we had a group from New York City. They brought with them a very brilliant lawyer who presented the case in favor of the "bonus." After he had retired from the floor a representative of the Retail Bakers' Association was heard, and to the surprise of all he stated that the Retail Bakers' Association, which represents some 26,000 bakers in the United States, had come to the conclusion after years of study that the standard-weight law is best for the bakers on the ground that it provides fair competition among bakers.

A few days after this hearing I received a wire from Cincinnati from the bakers' association there, saying that an attempt would be made at the bakers' convention at Cincinnati, March 11, to pass a resolution asking for the repeal of the Ohio bread law, and also a resolution against the Federal bread bill, and I was asked to come and present the matter in favor of standardization of bread. I thought it was important enough to go, and I did appear before that convention of some 200 bakers. There were there men from outside of Ohio, although this was an Ohio convention, and some of those men journeyed from New York, and they were there for the purpose which had been outlined to me. But I want to say to you that after a full discussion on that floor there was a resolution

passed favoring the Ohio bread law and requesting the enactment of the Federal bread act on the ground that the consumers were entitled to fair treatment and that the bakers were entitled to fair competition.

I have since also received the same kind of resolutions with the same import from the Indiana Bakers' Association, and since then I have also been seen by a representative of one of the big bakers in New York and he has said to me: "You have the consumers of the country with you. You have three-fourths of the bakers with you on this question. We have been fighting against standard-weight bread laws for years. These bread laws come up in many States every year and we have to fight them down; and I believe that we bakers in New York are now about the only ones opposing and that we are carrying the responsibility for short-weight bread, and that we ought to lift that burden from our shoulders and go before the Committee on Agriculture in Washington and tell them to pass that law and thereby get the credit for accomplishing this purpose."

Everything was working lovely and then something happened. The United States Supreme Court rendered a decision relative to Nebraska's bread law. You men are all familiar with the decision and there will be lawyers here to discuss it. The decision has delayed, but it has not discouraged me. I can see that the Supreme Court has reviewed all the elements and phases of the standardization of bread and that they have by implication approved all the features save one and that is as to the tolerance. Since the decision was rendered I have had, as I have said, the cooperation of the Bureau of Standards, and the cooperation of the Department of Agriculture. We had five lawyers sit down and study the evidence and the decision of the Supreme Court; and we have had these five lawyers come to a unanimous agreement as to the wording of the tolerance provision. I have the assurance of the Solicitor of the Department of Agriculture that the tolerance provision as now worded will withstand any assault made on it before the Supreme Court.

Now, I think I have taken up as much time as I should, but I want to say to you in parting that I think each of you has a grave duty to perform, and that is to see that your State has a bread law, and to see that you know exactly how to write that bread law before you leave Washington; and I will add that it is of supreme importance that we agree on a uniform law, as to the salient features of the proposition. It is vital that the State laws do not conflict with the national law, and I promise you that we will have a national law, no matter how long it takes to get it.

THE APPLICATION OF SCIENTIFIC METHODS OF LAW ENFORCEMENT

By Dr. H. E. Barnard, *Director, American Institute of Baking*

Ladies and gentlemen, for 20 years I worked for the people of the United States as an enforcing officer of food and weights legislation. At the present time I represent the baking industry. May I say to you, my friends, that I feel that I still am working for the people of the United States. I wish I had an opportunity to discuss at this time the subject that Mr. Brand has brought before you,

but I am going to hold myself strictly to the subject assigned to me. Perhaps I can take part in the discussion later.

In his first annual message to Congress, President Washington said, "Uniformity in the currency, weights, and measures of the United States is an object of great importance." In his second message he again referred to this subject, and in his third annual message he said, "Uniformity in the weights and measures of the country is among the important objects submitted to you in the Constitution and if it can be derived from a standard at once invariable and universal, must be no less honorable to the public councils than conducive to the public convenience."

Nearly 150 years have elapsed since Washington first brought the subject of weights and measures to the attention of Congress, and to-day we are still considering the matter. It is true that we now have official standards, but these are for the most part standards established by State legislatures, for while Congress delayed action year after year, in order to facilitate commerce the States themselves were compelled to set up the standards essential to the transaction of business.

The standards adopted independently of the Government and of each other varied widely. In 1830 the Senate directed the Secretary of the Treasury to compare the weights and measures in use at the principal customhouses. This investigation disclosed wide discrepancies between the standards, and without waiting for further authority from Congress the Treasury Department took immediate steps to correct unsatisfactory conditions by adopting definite standards. In 1836 Congress instructed the Secretary of the Treasury to deliver to each State a complete set of the new standard weights and measures, and in the course of years most of the States adopted these standards as their own.

These standards were adopted almost 100 years ago, but Congress is still discussing the enactment of adequate weights and measures legislation, and bills are still being introduced to standardize certain commodities. The astonishing thing about the whole subject is that, in spite of varying standards and inadequate legislation, commerce and industry is carried on as successfully as it is.

In the address made by Commissioner Miller, of Indiana, at the Sixteenth Annual Conference on Weights and Measures, he has pointed out certain absurdities which exist in weights and measures legislation. The variations and discrepancies in the number of pounds required to make a legal bushel in the case of well-known commodities still frequently sold by the bushel measure are most interesting.

He says, for instance, that while "44 States fixed a bushel weight of potatoes at 60 pounds, yet North Carolina has seen fit to break the rule by requiring only 56 pounds. Twenty States have standardized the bushel of redtop grass seed at 14 pounds, but Virginia insists upon 40 pounds, or nearly three times the customary standard. Forty-four States have adopted 56 pounds for a bushel of rye, yet California requires but 54 and Louisiana only 32 pounds. The bushel of spinach has been variously standardized at 10, 12, and 30 pounds. Salt has been standardized at 50, 55, 56, 60, 62, 70, 80, and 85 pounds to the bushel. A bushel of fine salt in Indiana

is 55 pounds and of coarse salt 50 pounds, but exactly the reverse is found in the adjoining State of Illinois. Ten pounds of kale are required for a bushel in North Carolina, 12 pounds in Maine and Massachusetts, and 30 pounds in South Carolina and Tennessee. Peaches are standardized in the various States at from 40 to 54 pounds per bushel, pears 36 to 58 pounds, and plums 28 to 64 pounds.

"Evidently but few bushel weights have been established through experimental or scientific investigation. A commission appointed to consider the revision of established bushel weights in Massachusetts has published a table comparing the bushel weights established for certain commodities with the weights of those commodities as determined by actual weighings. In but few instances do the weights adopted even approximate the average found from the weights determined.

"Great alarm would occur and much injury result to commerce should some of the States attempt to reduce or increase the length of the yard, or increase the standard avoirdupois pound, yet the States have continued to establish by legislation new bushel weight standards until the whole system is a hodgepodge. It is no more absurd to say that the yard shall be 35 inches in Texas and 36 inches in Oklahoma than it is to say that a bushel of plums shall weigh 28 pounds in Michigan and 50 pounds in Ohio, or that rye shall consist of 32 pounds in Louisiana and 56 pounds in Florida, yet scores of such absurdities are revealed by the tables to which reference has been made."

Is it not high time for legislators to pause from their labors and to consider whether or not, in setting up legislation affecting the weights and measures of commodities, some true scientific basis may be found upon which to base proposed and desirable legislation?

I have pointed out wide discrepancies between the weights of bushels of certain commodities. May I now bring to your attention the fact that even if the bushel weights of commodities were the same in all the States, the enforcement of weights and measures legislation would still be illogical and unsound if other conditions than the cubical content of the bushel and the weight of the materials contained therein are not set up.

In many States a bushel of corn weighs 70 pounds before the first of December and 68 pounds thereafter. This difference in the weight of the bushel was undoubtedly a recognition by the legislators of the fact that corn on the ear loses weight in storage. What is true of corn is true of a great variety of substances. Indeed this statement may be applied to almost every commodity which contains water as an essential constituent or which is hygroscopic in character.

What, for instance, is a ton of hay? Is it 2,000 pounds of hay air dried in the field, stored in the mow, or baled into convenient packages? What is a ton of coke? It is 2,000 pounds, to be sure, but how much water should the coke contain? What does the customer get when he purchases 50 pounds of raisins or dried apples, or of any other dried fruit? If he lives in New Orleans he gets a definite quantity, 50 pounds, to be sure. He gets the same weight in Denver, but he certainly does not get in any case the same amount of food, for the moisture content of all dried fruits varies directly with

temperature and humidity conditions. In a personal communication from the department of agriculture of one of the western States, the chemist says, "In the case of raisins and dried fruit the variation in weight has been found to be large, owing to the fact that such products are often retained on the grocer's shelves for a considerable length of time. If the product as originally packed contains a considerable amount of water, the shrinkage would be as much as 15 to 20 per cent in weight."

In an endeavor to secure data showing the usual practice in the enforcement of weights and measures legislation, I have recently asked the weights and measures officials of the country for information covering this subject. I regret that very little data on the subject of the change of moisture content under varying temperatures and humidity conditions are obtainable, and I am forced to conclude that in the enforcement of weights and measures laws the purpose is not so much to determine the amount of food sold the consumer as the actual weights of the product at the time of delivery. The consumer is, therefore, offered but a partial protection in his desire to know just what he is getting for his dollar. May I quote from such data as are available on the subject?

In 1911 the State board of health of Kansas studied the changes in the weight of stored butter. The studies reported were made upon several samples of butter held under varying conditions. One package of 60 pounds of butter made by the dairy department of the Kansas State Agricultural College, was packed in a tub lined with parchment paper and placed in the cold-storage room of the dairy department. A second lot of fifty 1-pound prints, separately wrapped in single parchment papers and paraffined cartons, were held in a wooden case in the same storage. Five 1-pound prints, separately wrapped in single parchment papers and paraffined cartons, were also placed in the cold storage. Five 1-pound prints, wrapped in single parchment papers and paraffined cartons, were placed 5 feet from a radiator in a room heated at ordinary living temperature.

The experiments were started on December 29. On July 6 of the following year the investigations were concluded. During this period of a little over six months the tub containing 64½ pounds of butter lost 3½ pounds. The average loss of the five prints kept in cold storage and separately exposed was 12.4 grams or less than one-half ounce.

The five prints stored in the room at living temperature were kept under observation until April 22, when the experiment ended. The losses ranged from 22.8 grams to 26.9 grams, or a little less than 1 ounce.

These losses were not great, but they were definite and would have to be considered by any dealer who carried quantities of butter in cold storage for a considerable length of time. Of course, the point to the whole investigation is the fact that the same amount of butterfat was present at the end of the experiments in each case as in the beginning. The change in weight was entirely due to loss of moisture.

Flour is usually thought of as a stable product. This is far from the case. Some 40 years ago Clifford Richardson, then an investi-

gator of the division of chemistry of the Department of Agriculture, studied the weight of flour with respect to the relative humidity of the air. He exposed five lots of flour for 18 days and made at intervals 15 moisture tests on each flour. The flours varied in moisture content when the test began, from 7.80 to 13.68 per cent. The flour was exposed in a room with free access to the air, but protected by a screen from other influences than air.

The tests showed that the weight of the flour was dependent upon the relative humidity of the air. During the 18 days the relative humidity of the air varied from 34, the lowest, to 66.9, the highest. Taking 100 pounds as the weight at the commencement of the test, the weight of one sample, for instance, was 99.88 pounds when the humidity of the air was at 34, and 102.88 pounds when the humidity stood at 66.9. The gain in one sample of flour at the end of the test, when the humidity was 66.9, was 5.95 pounds, or 5.95 per cent. Others gained less, but all gained except the one with the 13.68 per cent of moisture, which weighed 99.35 pounds, having lost 0.65 of 1 per cent in the 18 days. All the flours except this last were exceptionally small in moisture content, while this one sample was unusually large in moisture content. The tests conclusively showed that flour will take on and part with moisture as the humidity of the air rises and falls.

J. T. Willard, analyst of the Kansas State Board of Health, in 1911, studied the variation in moisture content of sacked flour. In the experiment twenty-seven ¼-barrel sacks were piled as closely together as possible in three layers of nine sacks each in an airy room, which during the winter months was heated to ordinary room temperature. Each of the sacks was weighed monthly for a period of 12 months. Very little loss was observed during the first two months. When the room was heated during the winter there was a steady loss which, however, was in part made up by slight gains during summer months. At the end of the period during which the room was heated, the average loss was 0.79 pound per 49-pound sack.

The results of these experiments have been confirmed thousands of times by millers and by flour buyers who have noted decided difference in the weight of flour on arrival from the weight when shipped. In the enforcement of the food and drugs act many cases have been filed against millers for shipping short-weight flour. In some cases there has been no doubt as to the guilt of the miller, but in other cases the shortage was undoubtedly due to the loss of moisture during the period which elapsed between the packing of the flour and its weighing by the customer and inspector.

The tendency of flour to take on and lose moisture has recently been studied by C. H. Bailey, who, in a paper on "The hygroscopic moisture of flour exposed to atmospheres of different relative humidity," shows conclusively that flour responds readily to changes in the humidity of the surrounding air, the rate at which equilibrium in moisture content is approached depending apparently upon conditions of exposure. The author quotes other investigators, including Willard, Neumann, Guthrie and Norris, Sanderson, Swanson, Willard and Fitz, and Stockham, who have studied the changes in weight and moisture content of stored flour.

Some idea of the variation in moisture content of flour milled from different varieties of wheat in different sections of the country is shown by the figures below, which are averages of some 800 cars of flour shipped during the first four months of this year.

Firm (shown by number)	Average moisture content		
	Lowest	Higbest	Average
1	10.36	13.52	11.46
2	9.56	13.40	10.78
3	11.30	13.29	12.31
4	10.48	12.68	11.83
5	9.87	12.28	10.80
6	9.44	11.70	10.38
7	11.34	13.52	12.61
8	10.53	12.31	11.41

The wide ranges in the moisture content of these flours, though they were milled under carefully controlled conditions, show most definitely the need for taking the moisture content of flour into consideration when determining flour weights. To fail to do so introduces the element of guesswork into the transaction. Fluctuating moisture contents have exactly the same effect on business as fluctuating money values or unstabilized exchange.

Stockham reports the moisture content of wheat, bran, shorts, and flour exposed in a "saturated" and "dry" atmosphere, but he did not employ any degrees of atmospheric humidity between these extremes. He found that a composite sample of flour exposed in a "still, saturated" atmosphere at a temperature of 23° C. reached a maximum moisture content of 28.74 per cent in 9.12 days, at which time it was moldy. In a saturated atmosphere at 0° C. a moisture content of 34.78 per cent was reached in 17 days, which he states was not the maximum.

Schollenberger, in Bulletin No. 1013 of the United States Department of Agriculture, refers to the "well-known fact that the normal moisture content of air-dry wheat is higher when stored in moist climates than when stored in dry climates." The author further defines the term "normal" as that point at which equilibrium is established between the moisture content of the wheat and the humidity of the air.

North Dakota Experiment Station Bulletin No. 120, 1917, on the capacity of wheat and mill products for moisture, says in part, "One of the well-known relationships of the moisture content of wheat is its approximate parallelism to the humidity of the atmosphere. The moisture problem would be relatively simple if all samples responded the same under like conditions, but unfortunately they do not, as they differ in their rate of change, or natural capacity. The capacity of wheat and its products for atmospheric moisture and water increases as the physical equilibrium between the component particles is approached."

Shelled corn loses weight in storage. In experiments conducted by the office of grain standardization, United States Department of Agriculture, corn held in the hopper of an elevator scale for 147 days

lost 5.6 per cent. J. W. T. Duvel and Laurel Duvel, in United States Department of Agriculture Bulletin No. 48, 1913, commenting on these tests, say, in part, "There is unquestionably a natural shrinkage in commercial corn during transit and while in storage, which varies with the moisture content of the corn and the atmospheric conditions to which it is exposed."

In a personal communication from the Bureau of Plant Industry of the United States Department of Agriculture, my correspondent points out that "there is a loss in weight of apples, corn, hay, etc., when held in storage. This is due, to a large extent, to the loss of water. At the same time in many fruits and vegetables which are alive in storage there are changes, mostly catabolic, which take place more or less rapidly according to the character of the product or temperature at which it is held. The changes according to Van't Hoff are doubled or trebled with each 10° rise in centigrade. There are, of course, a great many changes in the physical conditions which are progressive and which are apparently influenced by the temperature conditions."

Bread as commercially sold to-day is either manufactured in standard sizes or sold under a declaration of its weight. It is probable that no food commodity on the market is so subject to fluctuations in weight as is bread. This is due to the fact that the moisture content of freshly baked bread is high, as well as to its composition, which is so largely starch, itself very hygroscopic.

In an address made to the weights and measures officials of Indiana at their 1924 conference, which was later printed in Baking Technology, I showed the loss of moisture in commercial bread baked and analyzed at the laboratories of the American Institute of Baking, after having been exposed to the usual temperature and humidity conditions of the room. The average moisture content of the bread one hour after baking of a series of 13 loaves which were exposed unwrapped, was 36.23 per cent; 24 hours after baking the moisture content was 29.20 per cent; 48 hours after baking the average moisture content was 24.93 per cent; 72 hours after baking the average moisture content was 21.59 per cent.

Loss in weight of bread in 24 hours, made from flour with absorptions of 55 to 68 per cent, and showing variations in formula, grade of flour, temperature, and humidity[1]

[Average losses calculated from 12 to 15 weighings of individual loaves after exposure to the stated temperature and relative humidity for 24 hours]

Type of bread	Kind of dough	Fermentation	Grade of flour	Absorption of flour	Salt	Sugar	Milk, sweet, condensed	Malt	Lard	Yeast	Dough scaled at—	Average weights of bread when baked	Average loss, 24 hours	Maximum loss, 24 hours	Minimum loss, 24 hours	Average loss, 24 hours	Maximum loss, 24 hours	Minimum loss, 24 hours	Room temperature, 24 hours	Room humidity, 24 hours	Outside temperature, 24 hours	Outside humidity, 24 hours
		Hours		*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Ounces*	*Lbs.*	*Per cent*	*Per cent*	*Per cent*	*Ozs.*	*Ozs.*	*Ozs.*	*°F.*	*Per cent*	*°F.*	*Per cent*
Round top	Straight	2.50	First patent	55.0	1.70	1.50	2.00	0.50	2.00	2.16	27	1.5	5.26	5.79	4.70	1.26	1.39	1.13	79.3	47.8	65	67
Do	do	2.50	do	56.0	1.70	1.50	2.00	.50	2.00	2.16	18	1.0	7.52	8.05	7.08	1.20	1.29	1.13	77.9	44.0	65	67
Do	do	2.75	do	58.0	1.70	1.50	2.00	.50	2.00	2.16	18	1.0	7.05	7.67	6.30	1.13	1.23	1.01	81.1	53.3	68	70
Do	do	2.75	do	60.0	1.70	1.50	2.00	.50	2.00	2.16	18.5	1.0	8.04	8.63	6.80	1.29	1.38	1.09	83.6	51.2	70	77
Do	do	2.75	do	62.0	1.70	1.50	2.00	.50	2.00	2.16	18.5	1.0	8.23	9.09	7.00	1.32	1.45	1.12	86.0	35.0	70	77
Do	do	2.75	do	65.0	1.70	1.50	2.00	.50	2.00	2.16	18.5	1.0	8.30	9.09	7.64	1.33	1.45	1.22	82.4	42.0	66	70
Do	do	2.75	do	68.0	1.70	1.50	2.00	.50	2.00	2.16	18.5	1.0	9.22	9.90	8.44	1.48	1.58	1.35	86.0	37.0	70	74
Do	do	3.00	First clear	61.6	1.70	1.50	2.00	.50	2.00	2.16	18.5	1.0	8.09	8.90	7.30	1.29	1.42	1.17	85.5	38.0	72	88
Do	do	2.75	First patent	60.0	1.70	1.50	2.00	.50	None.	2.16	18.5	1.0	7.51	7.88	7.08	1.20	1.26	1.13	85.5	39.7	74	83
Do	do	2.75	do	60.0	1.70	1.50	3.00	1.00	2.50	2.16	18.5	1.0	7.81	8.23	7.36	1.25	1.32	1.18	85.5	39.7	76	80
Vienna	Sponge	5.50	do	59.0	1.15	.76	.86	.58	.58	1.25	19	1.0	6.46	6.92	6.00	1.03	1.11	.96	84.6	39.0	74	78
Split top	Straight	2.50	do	55.0	1.70	1.50	2.00	.50	2.00	2.16	2@9.25	1.0	7.61	8.26	7.37	1.22	1.32	1.18	79.3	46.7	65	67
Do	do	2.75	do	58.0	1.70	1.50	2.00	.50	2.00	2.16	2@9.25	1.0	8.09	8.69	7.31	1.29	1.39	1.17	81.1	53.3	68	70
Do	do	2.75	do	60.0	1.70	1.50	2.00	.50	2.00	2.16	2@9.25	1.0	8.00	8.80	7.36	1.28	1.41	1.18	86.0	35.5	70	77
Do	do	2.75	do	62.0	1.70	1.50	2.00	.50	2.00	2.16	2@9.25	1.0	9.02	9.67	8.19	1.44	1.55	1.31	83.6	51.2	70	77
Do	do	2.75	do	65.0	1.70	1.50	2.00	.50	2.00	2.16	2@9.25	1.0	9.56	9.88	8.60	1.53	1.58	1.38	86.0	37.0	66	70
Snowflake	do	2.50	do	55.0	1.70	1.50	2.00	.50	2.00	2.16	18	1.0	7.22	7.42	5.54	1.16	1.19	.89	79.9	47.8	65	67

[1] As determined at American Institute of Baking.

Similar studies were made of the loss in weight of different types of bread made with varying amounts of water; that is, with flour of varying absorption. The average loss in 24 hours of unwrapped bread varied from 1.03 to 1.53 ounces.

Bread wrapped in paraffin paper lost very little moisture. When heavily waxed paper was used the loss in 24 hours time on a 17-ounce loaf was but 0.41 ounce. When wrapped in paper with a less dense paraffin coat, the loss was approximately twice as high, or 0.82 ounce.

From unpublished data furnished me by the chemist of a large bakery organization I quote the following figures: Loaves made from a lean formula, that is, containing no shortening or sweetened condensed milk, contained when taken from the oven an average moisture content of 42.91 per cent; 72 hours later, at the conclusion of the experiment, they contained but 34.97 per cent of moisture, a loss of 7.94 per cent. The average weight of the loaves when taken from the oven was 768.5 grams. At the conclusion of the experiment the average weight was 674.5 grams.

Similar studies made on bread with a rich formula containing 7 per cent of sweetened condensed milk and from 2 to 3 per cent of shortening showed an average moisture content on the freshly baked bread of 41 per cent, whereas 72 hours later at the end of the experiment the moisture content was but 33.08 per cent, a loss of 7.92 per cent of moisture. The average weight of these loaves when freshly baked was 806 grams. At the conclusion of the experiment the average weight was 710.5 grams.

But whatever the condition or weight of the bread (and this statement is true of all foodstuffs which gain or lose in weight under varying conditions of humidity and temperature) the change in weight is always due to loss or gain in water content. There is no change in the content of the food ingredients. A loaf of bread containing 38 per cent of water and weighing 16 ounces will contain just as much food for the maintenance of bodily efficiency after its moisture content has been reduced to 20 per cent, to 10 per cent, or to 0. The fuel value of a ton of coke is determined not by the weight of the coke but by the weight of the moisture-free matter. This is not entirely a true statement, for in the case of fuels containing water a certain number of British thermal units will be consumed in evaporating the moisture content. When, however, foods are burned in human metabolism it is not necessary to take this fact into account. The only point which interests us is the absolute quantity of food obtained.

In a bulletin of the Kansas State Board of Health, J. T. Willard very pertinently points out the necessity for an accurate basis for the determination of legal weights. He says, in part:

> The change of weight to which commodities sold by weight are subject is a very important factor in the commercial world. The honest farmer who salts the cattle well that they may be encouraged to drink freely of water just before they go on the buyer's scales, and the milkman whose most effective ally is the pump, are but crude workers in a field of practice in which certain other producers are more skillful even if no more honest. It is obvious, too, that a dealer might suffer considerable loss by the natural drying of a commodity kept in bulk and sold by weight. On the other hand, it is not impossible that if he holds it under more humid conditions he may profit from an unearned increment due to the absorption of moisture.

Even the few illustrations I have cited of scores I might lay before you are sufficient to sustain the belief that the present method of enforcing weights and measures legislation is not in accord with Washington's expression which I have already quoted, and in which he points out the importance of uniform weights and measures "derived from a standard at once invariable and universal." It is obvious that our present method of determining quantities of commodities by the scale without at the same time taking into account their moisture content is not such a standard. It is equally obvious that laws and regulations governing the sale of commodities by weight which do not recognize the hygroscopic character of most food commodities can not be enforced except to the disadvantage of the buyer or seller, or both.

Can we longer ignore the obvious fact that the real value of food commodities is not determined by measure or weight, but by the number of food units sold? The moisture or water in the commodity in question increases the weight and usually the bulk, but it does not in the slightest degree add to the nutritive value.

The point may well be made that unless foods or other commodities have a recognized moisture content it will not be possible to establish a standard by which the quantity in question may be measured. This is true. It would indeed be impractical to say that the weight of flour, of raisins, of coke, of butter, of bread, should be determined by adding to the weight of the moisture-free substance a definite moisture content unless such a moisture content had been determined and fixed, either by universal custom or by legislative enactment. Fortunately, such moisture standards are recognized in the case of many commodities.

The moisture standard of butter is fixed at 16 per cent, of flour at 13.5 per cent, of bread at 38 per cent, of No. 1 hard red spring wheat at 14 per cent, grade No. 5 hard red spring wheat 16 per cent, grade No. 1 hard red winter wheat 13.5 per cent, while grade No. 5 of the same type of wheat is set at 15.5 per cent. The moisture content of grade No. 1 shelled corn is 14 per cent while the sixth grade of the same corn may contain up to 23 per cent. The moisture content of grades 1, 2, and 3 oats shall not exceed 12½ per cent, while grade No. 4 shall not exceed 16 per cent.

The Bureau of Agricultural Economics of the United States Department of Agriculture is charged with the grading of wheat, shelled corn, and oats, according to the official grain standards of the United States. At the present time the Government maintains 36 supervision stations and 190 inspection stations for the testing of these grains, and approximately 450 inspectors are employed in enforcing the grain standards act. In 1923 these inspectors tested 2,000,000,000 bushels of grain, making some 1,400,000 inspections. Of this great number of inspections some 400,000 inspections were of corn and included the determination of the moisture in the sample. This work which is being carried on so successfully by the Federal Government is an outstanding example of the recognition of the fact that the moisture content of commodities subject to inspection must be taken into consideration.

At a recent meeting of the weights and measures officials of the State of Indiana, the following resolution was adopted:

Whereas it has been alleged that in the enforcement of weights and measures legislation the only scientific method of arriving at the actual weight of certain products with recognized properties of gaining and losing moisture is by determining the weight of the water-free substance, and with basic data so obtained to calculate the original weight at time of production by adding thereto the legal or recognized moisture content: Therefore be it

Resolved, That this conference of State, county, and city inspectors of weights and measures requests of the Bureau of Standards of the United States Department of Commerce certain data bearing on this subject, as follows:

1. Is the method of calculating the weight of bread at the time of manufacture, or flour at the time of packing, by determining the weight of moisture-free substance and adding the legal or allowed moisture content scientifically correct?

2. Is it practical to suggest to weights and measures departments that present methods of law enforcement be improved by providing that the actual weight of products at time of manufacture or packing may be calculated by adding to the moisture-free content of the substance in question the legal or allowed moisture content?

3. Is it possible to devise methods for determining the moisture-free content of bread, flour, or other substances which may be used, by inspectors of weights and measures?

4. Is it advisable to work to the end that inspectors of weights and measures be equipped with instruments of precision and with laboratories and departments in which they may be properly employed, to the end that weights aud measures legislation may be based and enforced on true scientific principles?

Three groups of men are anxiously awaiting the conclusions of the Bureau of Standards—the group which deals in commodities which fluctuate in weight under varying temperature and humidity conditions, the group of scientists and technologists which recognizes the necessity for correct standards based on a scientific foundation, and the group of officials charged with the enforcement of weights and measures legislation.

I have, I trust, pointed out the interest and concern of the first group, and laid, though briefly, the foundation for my argument on behalf of the scientific world. I have not discussed as yet the practicability of improving the present methods of law enforcement so that the actual weights of products at the time of manufacture may be determined by adding to the moisture-free content the recognized or legal moisture content.

It has been pointed out to me by inspectors of weights and measures that it is impractical for them to complicate their work by introducing a technique which requires the services of a laboratory. Some officials have advised me that while they recognize the desirability of improving on present methods of work they do not have the funds with which to equip laboratories or employ chemists. Other inspectors have said that their work would be handicapped and the progress of justice delayed by any requirement of laboratory service or scientific study. These arguments, or excuses, for they can not be more than that, must, I believe, fall before the facts and the established practices already in vogue. In the prosecution of cases involving the sale of skimmed or watered milk the inspector no longer presents his evidence backed by only the hydrometric report showing the specific gravity of the sample in question. His testimony is fortified by the testimony of the chemist who has determined the exact fat content of the milk. The grades of grain are no longer determined by taking the weight per bushel and separating the dockage. Every sample goes to the laboratory where its moisture content is accurately determined. The final grading, there-

fore, is, in the case of wheat, based upon the minimum test weight per bushel, the moisture content, the percentage of damaged kernels, the amount of foreign material other than dockage, and the presence of wheat of other classes.

If in the enforcement of the United States grain standards act it is necessary to determine in the case of every sample the exact moisture content before the grade of the grain under investigation can be fixed, may it not be equally practicable to determine the moisture content of other commodities subject to inspection? It may be argued that there is no rapid method for the determination of the moisture content of dried fruits, of flour, of bread, of butter, and that the wheels of justice should not be delayed to permit the use of the present slow methods of moisture determination. Is it not probable that when the need arises, rapid methods of work will be devised?

The butter-fat content of milk is no longer determined by extracting the fat with solvents. The Babcock milk tester now makes it possible to determine the fat content of milk in a few moments. The officials who enforce the grain standards no longer determine the moisture content of grains by slowly drying out the moisture in a vacuum oven. The Brown-Duval moisture tester has been fitted to the use of the inspector so that his work may be carried on rapidly and accurately.

Whenever a need arises in industry the need is met. This is just as true in science. And can we not go further and hope that when cities, states, and nations recognize the fact that the enforcement of weights and measures regulations rests upon the application of science rather than upon the appointment of politicians to a minor office, we will have lifted into its proper place the whole work of the inspector of weights and measures. We shall dignify the service, remove it from the realm of practical politics, and place it in the hands of scientifically trained inspectors, adequately equipped with laboratory facilities for the accurate application of the laws of physics and chemistry to the regulation of commerce.

DISCUSSION OF ABOVE PAPERS

The CHAIRMAN. Do you wish to start the discussion of bread, and of those other papers this morning? If you do, the meeting is open for general discussion of the papers presented this morning. This is a very important subject.

Mr. EMERY. Mr. Chairman, in discussing this last paper by Doctor Barnard, I have a letter from Joseph Poehlmann, president of the Retail Bakers' Association of America, that I would like to have read.

Mr. HOLBROOK. The letter is on the letterhead of the Retail Bakers' Association of America, 425 Otis Building, 10 South LaSalle Street, Chicago, Ill. It is dated Milwaukee, May 24, 1924, and is signed by Joseph Poehlmann, president. It reads as follows:

SEVENTEENTH ANNUAL CONFERENCE ON WEIGHTS AND MEASURES,
Bureau of Standards, Washington, D. C.

GENTLEMEN: As president of the Retail Bakers' Association of America, it has come to my attention that a proposal may be made to you to base bread-weight laws upon a basis of the dry substance found in loaves, plus 38 per cent moisture.

In the name of the association I earnestly protest against this proposal, as it puts the bread produced in the retail bakeries in the country in a false light.

The proposition is founded upon the assumption that, in the sale of bread, we offer the public a combination of the maximum quantity of water and the minimum quantity of nutritive matter allowed by law, and that in dealing with the weight of bread we insist upon our right to produce and sell every loaf upon the basis of the maximum quantity of water permissible.

Our efforts have been directed toward incorporating the maximum amount of nutritive matter into our bread. We have told the American people, bread is your best and cheapest food; if loaded down with 38 per cent water, bread is not the best and cheapest food, and we are not willing that our bread be judged upon the basis that it contains that percentage of water.

We want the American people to know the truth about bread, and that is that the water content of bread varies according to the type or kind of bread purchased, and seldom, if ever, reaches the fixed maximum of 38 per cent. We also want them to know that the bread we sell contains more than 10 ounces of nutritive matter in a pound.

We are on record as favoring the principle of standard weights for bread, and feel that legislation along the lines discussed would bring confusion and complications rather than standard loaves.

Respectfully submitted.

JOS. POEHLMANN,
President.

Mr. EMERY. I wish to say further, Mr. Chairman, that I can not agree with Doctor Barnard either in his reasoning or in his conclusion. I do not know that any standard for moisture has been determined for bread. If we say there is a standard, then there must be a legal standard. The only knowledge that I have in relation to this is that various food commissioners, those who are investigating the matter of standards, have given it as their opinion so and so, but so far as I know there is no legal standard for moisture content of bread in the United States. Certain committees have given their opinions, and the courts may accept or reject; they are not bound to them. In Wisconsin we have certain standards fixed by law, and it is a very difficult thing to change these with an opinion. The United States Supreme Court has passed on the question and said that the officers of the Government have no authority to go beyond the Constitution. I have had some experience with such opinions. In certain articles of food a drastic regulation of this character was enforced until the Supreme Court of the United States swept it aside—there was no authority for the regulation. So the idea of this moisture content being based upon a legal standard is, I think, incorrect. It seems to me it would be a fraud on the public. It seems to me that the matter of having precision instruments for the weights and measures inspection, and of having a laboratory inspect bread, and of carrying this process along all the lines of food would be an immense undertaking. It seems beyond the reasonable and legitimate domain of weights and measures.

The CHAIRMAN. Gentlemen, the time for recess has arrived. I am very sorry that it will be impossible for me to be with you during the remaining sessions, but I have an important engagement in Cleveland, Ohio, which will prevent my being here any further during this conference.

(At this point a motion to adjourn was made and seconded, the question was taken, and the motion was agreed to.)

(Thereupon, at 12.45 o'clock p. m., the conference took a recess until 2 o'clock p. m.)

FOURTH SESSION (AFTERNOON OF TUESDAY, MAY 27, 1924)

The conference reassembled at 2 o'clock p. m., W. B. McGrady, first vice president, in the chair.

GENERAL DISCUSSION IN RELATION TO THE BREAD SITUATION

The ACTING CHAIRMAN. Will the meeting please come to order?

The first number on the program will be the discussion of the papers that were read this morning in relation to the bread situation.

Mr. EMERY. Mr. Chairman, I wish to say that on the table there are nearly 100 mimeographed copies of an article which I have prepared pertaining to the Nebraska bread decision as related to the Wisconsin law. I have discussed it also to some extent in its relation to other decisions of the United States Supreme Court. Anyone who is interested is at liberty to take a copy of that material.

The United States Supreme Court has itself laid down the rule that where the question is a debatable one—that is, one upon which reasonable men differ—it is not a question for the courts to decide, but for the legislature. Now the Supreme Court of Nebraska sustained this law. Moreover, two members of the United States Supreme Court have dissented, and it would seem rather peculiar that in this age the Supreme Court itself is undecided on the question. But the majority of the United States Supreme Court says it is absolutely arbitrary and is, therefore, repugnant to the fourteenth amendment, and has swept aside the decision of the Legislature of Nebraska as unreasonable and arbitrary. Now it almost looks as though the question is debatable. Conditions in Nebraska are not comparable with the conditions in Wisconsin, and anyone of you who wishes to do business in Wisconsin can come, but we are ready to sustain our law.

Mr. HOLBROOK. Mr. Chairman, this morning I called attention to the majority decision of the Supreme Court of the United States, which is of very great interest to weights and measures officials, but on account of lack of time did not attempt to give any detailed attention to the minority opinion. I certainly would advise any official who has not had the opportunity of reading this case in full to take the time to read both the majority and minority opinions of the court. The minority opinion is just as strongly in support of the provisions of the Nebraska law as reasonable and necessary ones, as the majority opinion is to the effect that they are arbitrary and invalid.

A reading of the minority opinion is advised, because it is believed that it will make you all proud of the work which you are doing both individually and as members of this conference. Much of the material which has been used in assisting the justices in the minority to arrive at their opinion has emanated from you, from your reports, and from the reports of the proceedings of this conference, which are freely alluded to.

The reason for the utilization of this material is set out in the following language:

> The determination of these questions involves an enquiry into facts. Unless we know the facts on which the legislators may have acted, we can not properly decide whether they were (or whether their measures are) unreasonable, arbitrary or capricious. Knowledge is essential to understanding; and understanding should precede judging. Sometimes, if we would guide by the light of reason, we must let our minds be bold. But, in this case, we have merely to acquaint ourselves with the art of bread making and the usages of the trade; with the devices by which buyers of bread are imposed upon and honest bakers or dealers are subjected by their dishonest fellows to unfair competition; with the problems which have confronted public officials charged with the enforcement of the laws prohibiting short weights, and with their experience in administering those laws.

Later we find that to a very great extent the justices in the minority have gone outside the record of the case itself in their investigation into the essential facts, and this method of procedure is commented upon in the following words:

> Much evidence referred to by me is not in the record. Nor could it have been included. It is the history of the experience gained under similar legislation, and the results of scientific experiments made, since the entry of the judgment below. Of such events in our history, whether occurring before or after the enactment of the statute or of the entry of the judgment, the court should acquire knowledge, and must, in my opinion, take judicial notice, whenever required to perform the delicate judicial task here involved.

In seeking these facts, as I have mentioned, they have turned to the evidences of your work, and of your investigations and conclusions. They are impressed with the fact that the demand for standard-weight laws has constantly been gaining momentum, especially during the last few years. They note the provisions in these laws against excess weights and study the need for such a provision. In this connection they find:

> The efficacy of the prohibition of excess weights as a means of preventing short weights having been demonstrated by experience during the period of Food Administration control, a widespread demand arose for legislative action in the several States to continue the protection which had been thus afforded.

They detail the States recently adopting laws of this character and add:

> The national conference on weights and measures indorsed a similar provision.

And conclude:

> Can it be said, in view of these facts, that the legislators had not reasonable cause to believe that prohibition of excess weights was necessary in order to protect buyers of bread from imposition and honest dealers from unfair competition?

They then consider and answer affirmatively the question as to whether the prohibition of excess weights was calculated to effectuate the purpose of the act, coming to this conclusion, after noting the experience of States adopting such law and the fact that—

> * * * it has been indorsed by the national conference on weights and measures and is included in the proposed "Federal bread law."

They decide after similar study that the prohibition of excess weights does not impose unreasonable burdens upon the business of making and selling bread, stating: "* * * that it does not

require a higher degree of skill than is commonly available to bakery concerns;" basing this conclusion upon the following arguments:

It is generally conceded that the baker can predetermine with great accuracy the weight of a loaf of bead immediately after baking. See 14 Conf., Weights & Measures, p. 77; 15 *ibid.* pp. 80–84. Neither can it be reasonably contended that a 2-ounce tolerance is not enough to cover shrinkage after baking. For, pursuant to a resolution adopted at the Fourteenth Conference on Weights and Measures (p. 87), a series of scientific experiments were conducted. See 15 Conf., Weights & Measures, pp. 80–84. The committee on specifications and tolerances recommended to the conference a tolerance not in excess of the one here allowed. See *ibid*, p. 79.

The general conclusion from all the above is:

To decide, as a fact, that the prohibition of excess weights "is not necessary for the protection of the purchasers against imposition and fraud by short weights"; that it "is not calculated to effectuate that purpose"; and that it "subjects bakers and sellers of bread" to heavy burdens, is, in my opinion, an exercise of the powers of a super-legislature—not the performance of the constitutional function of judicial review.

Mr. Maroney. Mr. Chairman, this morning a letter was read here from the Retail Bakers' Association of America protesting against an allowance of 38 per cent for moisture content in bread. What Mr. Poehlmann is getting at is that the average bread will run about 34 per cent, whereas the water in the bread which was used to determine shrinkages in that Nebraska case must have been 40 per cent.

Mr. Holbrook. I have no official information as to the moisture content contained in bread, but I do know that 38 per cent, which is mentioned in the letter, has been fixed upon as a maximum in a food inspection decision issued in connection with the enforcement of the pure food law. As I understand this decision of the Bureau of Chemistry, it serves notice on all bakers that if their finished product does not contain more than 38 per cent moisture, the Bureau of Chemistry will consider that it is not adulterated with water, but if it does contain more than 38 per cent they will feel free to go into court and state it as their opinion that it is so adulterated. It is merely a food inspection decision of the Bureau of Chemistry, but was, I believe, drafted in cooperation with and is concurred in by various associations.

Mr. Barnard. Inasmuch as this letter of the Retail Bakers' Association of America was, perhaps, directed against the address that I gave this morning, I should like to have the record show that the title of my paper was "The practical application of scientific methods of law enforcement," and in no sense did I attempt to confine my paper to the enactment of laws which affected bread only. My thought is that my method of law enforcement should be applied to all materials which are hygroscopic; not alone to bread, as this letter would apparently indicate.

INDORSEMENT OF FEDERAL BREAD BILL, H. R. 8981, SIXTY-EIGHTH CONGRESS, FIRST SESSION (WITH TEXT OF BILL)

Mr. Brand. Mr. Chairman, I think that I might add a practical suggestion to what I said this morning. It is that before you leave here for home this conference should consider a resolution indors-

ing or condemning the Federal bread bill. I think we ought to know what you men think and I think that a suggestion of this kind is proper—that the weights and measures officials of the various States have a duty to perform in advising their Congressmen and their Senators of their ideas relative to this kind of legislation. I want to thank you for asking me to come here. I have enjoyed your meeting and I will now have to get back to the House.

(It was moved by Mr. Holwell, and seconded, that this conference indorse the so-called Federal bread bill, H. R. 8981, Sixty-eighth Congress, first session, introduced by Congressman Brand of Ohio.)

[The bill is as follows:

[H. R. 8981]

A BILL To establish standard weights for loaves of bread, to prevent deception in respect thereto, to prevent contamination thereof, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this act may be cited as the "Federal Bread act."

SEC. 2. (a) That when used in this act—

(1) The term "person" includes an individual, partnership, corporation, or association; but not a common carrier.

(2) The term "State" includes the District of Columbia.

(3) The term "twin or multiple loaf" of bread means the product obtained by so baking individual units that two or more adhere to one another, but are susceptible of separation by breaking. Whenever the word "loaf" or "loaves" is used in this act it shall be construed as including the individual units of twin or multiple loaves.

(b) The provisions of this act shall not apply to biscuits, buns, crackers, rolls, or other similar bread units, weighing less than four ounces each, or to bread commonly known as "stale" bread, and sold as such, in case the seller shall at the time of sale expressly represent to the buyer that the bread so sold is "stale" bread.

SEC. 3. The standard weights for loaves of bread shall be one-half pound, one pound, one and one-half pounds, and whole multiples of one pound, avoirdupois, within the tolerances provided in section 4 hereof.

SEC. 4. That a tolerance of three and one-half ounces per pound in excess of the standard weights prescribed in section 3 shall be allowed and shall be applied to the average weight of at least five loaves of the same nominal weight and of the same manufacturer, or to the average weight of all such loaves when the supply available at the time and place of the weighing exceeds five such loaves and is not more than ten such loaves. If more than ten such loaves are available, at least ten shall be weighed in determining the average. Whenever the number of such loaves available exceeds the number of loaves so to be weighed, the loaves weighed shall be taken at random.

SEC. 5. That each loaf of bread and each twin or multiple loaf shall be either completely wrapped or otherwise kept in such a manner as to substantially exclude dust and contamination.

SEC. 6. That each loaf of bread shall bear a plain and conspicuous declaration of its standard weight prescribed in section 3 hereof, together with the name of the manufacturer and the name of the place where manufactured. In respect to bread not wrapped, this declaration shall be printed upon a label not less than one inch square firmly and sanitarily attached to the loaf. In respect to wrapped bread this declaration shall be printed upon the wrapper. In respect to wrapped twin or multiple loaves, the declaration on the wrapper shall be the total of the standard weights of the loaves and, in addition, each unit of the twin or multiple loaves shall be labeled in the same manner as bread not wrapped. The declarations of weight herein required shall be in boldface capital letters and figures not less than twelve-point in size.

SEC. 7. That it shall be unlawful for any person to ship or transport, offer for shipment or transportation, or deliver for shipment or transportation, from any State to, into, or through another State loaves of bread which are not of one of the standard weights prescribed in section 3 within the tolerances applied pursuant to section 4 hereof, or which are not wrapped or otherwise kept as

required in section 5 hereof, or which are not marked as required in section 6 hereof. Any person who shall violate any of the provisions of this act shall be guilty of a misdemeanor and upon conviction thereof shall be fined not less than $25 nor more than $200 for the first offense and upon conviction for each subsequent offense not less than $50 nor more than $500.

SEC. 8. That loaves of bread the weights of which are not of one of the standard weights prescribed in section 3 within the tolerances applied pursuant to section 4 hereof, or which are not wrapped or otherwise kept as required in section 5 hereof, or which are not marked as required in section 6 hereof, and which are being transported from one State to, into, or through another State, or having been so transported remain unloaded, unsold, or in original unbroken packages, shall be liable to be proceeded against in any district court of the United States within the district where the same are found and seized for confiscation by a process of libel for condemnation. And if such loaves of bread are condemned as being in violation of any of the provisions hereof, the same shall be disposed of by destruction or sale, as the said court may direct, and the proceeds thereof, if sold, less the legal costs and charges, shall be paid into the Treasury of the United States. The proceedings in such libel cases shall conform as near as may be to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in any such case, and the proceedings shall be at the suit of and in the name of the United States.

SEC. 9. That all loaves of bread which do not conform to the requirements of this act, transported into any State and remaining therein for use, consumption, or sale therein, shall upon arrival within the limits of such State be subject to the operation and effect of the laws of such State enacted in the exercise of its police powers, to the same extent and in the same manner as though such loaves of bread had been produced in such State, and shall not be exempt therefrom by reason of being introduced therein in original packages or otherwise: *Provided*, That this shall not be construed to relieve any person or to exempt any bread from the penalties and forfeitures prescribed in sections 7 and 8 of this act.

SEC. 10. That it shall be the duty of each district attorney to whom the Secretary of Agriculture shall report any violation of this act, or to whom any health or food or weights and measures officer or agent of any State shall present satisfactory evidence of any such violation, to cause appropriate proceedings to be commenced and prosecuted in the proper courts of the United States, without delay, for the enforcement of the penalties and forfeitures as in such case herein provided.

SEC. 11. That the Secretary of Agriculture shall from time to time make such rules and regulations as he may deem necessary for the efficient execution of this act, and in furtherance of the purposes thereof may cooperate with any department or agency of the Government, any State, or department, agency, or political subdivision thereof.

SEC. 12. That the act, omission, or failure of any person acting for or employed by any individual, partnership, corporation, or association, within the scope of his employment or office, shall in every case also be deemed the act, omission, or failure of such individual, partnership, corporation, or association, as well as that of such person.

SEC. 13. If any provision of this act or the application thereof to any person or circumstances is held invalid, the validity of the remainder of the act and of the application of such provisions to other persons and circumstances shall not be affected thereby.]

Mr. EMERY. I wish to ask whether by the terms of that bill Federal jurisdiction is limited to interstate commerce or whether it goes into the State?

Mr. BRAND. Mr. Chairman, in this bill Congress assumes no authority beyond interstate commerce.

Mr. HOLWELL. Mr. Chairman, the reason why I introduced that motion is that I come from the city of New York, and represent that city where Congressman Brand says the consumers are losing nearly $11,000,000 annually on bread. I, like Congressman Brand, feel that the Nation should take some action in regard to the sale of bread. Any commodity in which the consumer is mulcted to the

extent of $100,000,000 annually should receive some consideration from the weights and measures officials of the United States. Moreover, the Congressman was conservative. Many of the manufacturers in the city of New York are selling loaves of bread for 8 or 9 cents which do not weigh 14 ounces, but 12 and 12½ ounces. While the bill does not enter into regulation within the individual States, nevertheless it shows to the respective States that Congress is vitally interested in this question. I hope after its passage that every State in the Union will follow the example set, and have enacted laws along the broad lines laid down by Congressman Brand.

The Acting Chairman. Mr. Holwell, I feel it a great pleasure on my part to put such a motion. We gathered data in 67 cities on the weights of 3,000 loaves of bread and we found 105 different weights.

(The question was taken and the motion was agreed to.)

Mr. Moore. I move we have a rising vote of thanks to Congressman Brand for his address this morning.

(The motion was seconded, the question was taken, and the motion was agreed to by a unanimous rising vote.)

Mr. Brand. I appreciate this very much and I thank you for your vote of approval of the Federal bread bill, which I am sure will have an influence upon Congress. But do not forget that you have a duty in reference to your State laws, and also that your influence with Members of Congress will be of great value, in writing them on this subject, because they know that you know more about it than anyone else.

INTERNATIONAL BUREAU OF WEIGHTS AND MEASURES AND GENERAL IMPRESSIONS OF WEIGHTS AND MEASURES ABROAD

By L. V. Judson, *Bureau of Standards*

Mr. Chairman, ladies, and gentlemen, during the past year I had the pleasure of being at the International Bureau of Weights and Measures, which is located at Sevres, a suburb of Paris, and of visiting various standardizing laboratories in Europe. Although my trip was primarily for the purpose of gathering information on the methods used abroad in precise measurements, I also had opportunity of observing some of the general conditions prevailing in the administration of weights and measures in Europe. I was especially interested in the work of high precision, and particularly in the recomparison of the meter which Doctor Stratton delivered to the International Bureau three years ago, and which I had the opportunity of bringing back to the United States after the work of recomparison was completed. Incidentally I also wanted to know what was going on in the various cities along lines of routine testing of commercial apparatus.

First, I will speak of the International Bureau of Weights and Measures. This bureau is small compared with the Bureau of Standards here in Washington. It has but seven or eight members on the scientific staff, and two principal buildings. The office building and residence of the director commands a view across the Seine, and of the entire city of Paris. It is one of the old houses formerly used by the royalty of France.

A special building has been built to house the laboratories conducting the precise measurements for which the bureau was founded. Special rooms are provided for (*a*) the comparison of geodetic standards; (*b*) the testing of commercial standards and gauges; (*c*) the comparisons incident to the determination of coefficients of thermal expansion; (*d*) the comparisons of the National prototype meters, one of the most important functions of the International Bureau; and (*e*) mass determinations. Several rooms are devoted to the work in connection with air and precision glass thermometers. This brief outline will serve, perhaps, to enable you to understand, in general, the character of work performed at the International Bureau.

It will interest you to know that the comparator now used in the tests of meter bars is the same one as was used by L. A. Fischer when he took our meter over for recomparison in 1903. In this connection, I may say that the conclusions reached by Mr. Fischer as a result of this recomparison, which at first were thought to be in error, have since been substantiated in every detail. It has been determined without question that meter No. 27, the United States prototype, has not really changed, but that two laboratory standards of the International Bureau have, in fact, altered to some extent, and that the coefficients of expansion of various meters were not originally determined with the accuracy now possible. I might also mention that it was in a room next to the balance room in which, in 1895, Doctor Michelson determined the value of the meter in terms of wave lengths or red cadmium light by the use of the interferometer, a notable achievement and a most valuable contribution to science.

Although geodetic work is not particularly related to the activities of this conference, you may be interested in seeing a picture of the 4-meter comparator used for comparing bars for geodetic base-line measurements of high-precision surveys. It shows the tendency toward a considerable complexity in a great many European instruments, which often tend toward enormous sizes. The Russian Government has a comparator of this type which is probably the newest, largest, and most up to date in existence. So much for the International Bureau, the work of which is primarily the comparison of standards of weight and measure.

As to general weights and measures impressions received abroad, I may say that many things in Europe appear strange to an American. For instance, in Holland they have a law which prescribes very definitely the character of weights which may be used. I have here one of a series of charts from which you will see that even the smallest details, such as the diameter of the knob, are carefully specified. This same character of regulation is found in relation to other classes of apparatus, although in the matter of scales there appear to be no proper requirements concerning their test and use. I have seen in use balances which were badly rusted, and others which were 30 degrees out of level.

To us in the United States it seems strange that automatic scales are not permitted in a number of countries in Europe. For instance, in Belgium certain types of automatic scales are not allowed. In Switzerland the weights and measures officials are rather hoping that they can get a law whereby the use of the automatic scales will be

permitted, but at the present time in the meat markets, for instance, the scales used are almost all of the old type with equal arms. Throughout Europe sales are made on the weight basis, at least as much or more so than in the United States; they use measures very little. They seem to have adopted the practice of selling almost everything by weight. And so we find everywhere these even-arm balances of all sorts of types; and as long as they can put a weight on one side balanced against commodity on the other, they appear to be satisfied.

Gasoline pumps and measuring devices are now in rather common use abroad, most of them being American made. A number of oil and gasoline companies are either American companies or are American controlled, and they are seeking to have the European countries promulgate regulations similar to the American specifications on gasoline-measuring devices, but there is as yet little, if any, legislation affecting these devices.

Turning now to the national bureaus I may first mention the Swiss. This bureau goes to the individual city, as the system is that of a centrally controlled testing and checking organization. In the bureau at Berne, Switzerland, is a lecture room to which the field men go to receive detailed instructions and information. The local sealers of weights and measures also test the track scales in their jurisdictions, so in this room are models of track scales as well as of other weighing and measuring devices. These officials periodically go to Berne to learn the details and new developments in their field of work. There is a sort of a lecture course given on the theory of the balances and methods of testing.

In Italy there is a school of instruction in weights and measures inspection work. A course has been outlined which all inspectors must attend. In the laboratory work connected with the course these men calibrate a subdivided length standard by the method of least squares, they calibrate sets of weights, and they are grounded in the fundamentals of laboratory methods of measurement. This is not with the idea that they will use these methods in the field, but in order that they may have knowledge of the precise methods used in the laboratory and will understand what refinements are necessary if they should ever encounter that type of work, and the full meaning of certificates and reports from the laboratory. The Italian bureau in Rome has an atlas of weights and measures which is somewhat like the Dutch one but very much larger and even more detailed. In this atlas I recently noticed that some dimensions on balances were specified down to the thousandth of a millimeter. The manufacturer must make his balance not merely so that it will weigh correctly, but it must be constructed according to these specifications.

Just a word about the museums. I visited many of them to see what was on exhibit to illustrate the design of apparatus at various periods, and found it very instructive, especially concerning the weights and measures of the world. In one of the museums in Paris—one of the largest museums of mechanical and other scientific and technical devices—I found that the manufacturers of the United States back in the sixties and seventies had sent over copies of what were then our latest scales. The atmosphere is very good in

Paris for the preservation of museum exhibits and they take good care of the instruments. Thus, these scales dating from 1860 to 1870 still appear bright and new. They are surrounded by later models of French, English, and German manufacture, and it appeared as if no particular effort had been made to secure or to send the latest American models of such things as balances or platform scales over there. Thus, to a casual observer, unless the dates were noticed, it would appear that the American scales were far behind those of European manufacture. This is one of the dangers of museums. I also examined some of the balances of 50 to 100 years ago, and they were very interesting. Although they were not precision balances, they did represent careful workmanship. Much time was spent, however, in putting scroll work and elaborate decorative designs on the balance. They took particular pride in making each individual scale, but that they did not usually make it a precision scale could be seen by a casual inspection.

[During the course of this address Mr. Judson exhibited lantern slides of the International Bureau of Weights and Measures, and also showed charts and other exhibits of interest.]

DISCUSSION OF ABOVE PAPER

Mr. Dale. About a year or two ago there was a cable dispatch from Paris stating that the International Bureau had found out that the meter had changed and that they were in doubt whether it was really a change in the length of the bar or the result of the widening of the lines from the washing of the meter. During your stay at the International Bureau, did you get any information on that point?

Mr. Judson. I got a great deal of information on that point. The international prototype meter had remained absolutely unchanged and, in fact, the meters of the different countries were in every case, as far as could be determined, the same as when they were first compared. The unfortunate fact is that two meters, which were laboratory standards at the International Bureau—not fundamental standards, but two bars used for laboratory work—did change; but that did not invalidate the work of the bureau except in a few instances. It was with these laboratory standards that Mr. Fischer made his comparison in 1903, and not with the primary standard. That was what caused the discussion regarding our meter. The strange thing is that those two laboratory standards changed, and changed alike. The International Bureau was amazed, because they had compared these two standards with each other for a good many years and it was supposed that, inasmuch as they remained the same relative to each other, in all probability they were retaining the same length relative to the prototype meter and to the national standards. Why those two laboratory standards changed is really unknown. The change was of the order of three ten-thousandths of a millimeter, three-tenths of a micron, or to put it another way it is three ten-millionths of a meter.

Mr. Dale. At what temperature do they make these comparisons? Is it at zero centigrade or is it at the ordinary temperature of the room?

Mr. JUDSON. Ordinarily at the room temperature. However, measurements are also made for the coefficient of expansion, in which case comparisons are made at temperatures from zero to 40° and more centigrade.

Mr. DALE. Is the prototype meter—that is, the one marked with the large "M"—kept the year round at the same temperature, or does the temperature vary with the seasons?

Mr. JUDSON. In the vault where the meter is kept the temperature is very nearly constant. I am not sure of the actual temperature variation, but believe it is but a fraction of a degree. Below the basement of the laboratory building there is a vault where the laboratory standards are kept, and down below that vault is the vault where the prototype meter is kept, and it is sufficiently far below the ground surface so that the temperature is very nearly constant. It should be remembered that the outside temperature variation is much less in Paris than it is here in Washington.

Mr. DALE. Some time ago Doctor Guillaume wrote me that they had their doubts about the practicability of establishing standards and verifying them by light rays and that they were experimenting with new materials, trying to get something better than this platinum-irridium alloy, and he mentioned quartz. I would like to ask if you can give any information on that?

Mr. JUDSON. The only information I can give is this: There is a way of using the wave length of light as a unit of length. The wave length of light is very short, and secondary standards are needed. These must be end standards and not line standards, and it has been proposed that quartz be used. At this time a man named Perard is working on this investigation, but so far as I know there have been no final results on it.

Mr. SPOTZ. This question of accuracy is of importance to everybody, and it has often occurred to me that while it is possible to make accurate comparisons in the laboratory on your test bar, you are governed by the accuracy of measurement of the room temperature.

Mr. JUDSON. The thermometers which are used for this high-precision work are French thermometers. We find that there is no one in Germany or France, or indeed in all Europe, who is able to make at the present time thermometers accurate enough for this high-precision work. There are, however, a considerable number of thermometers that were distributed along with the meters to the different countries—the Bureau of Standards has several of them—that have been standardized to a high precision. With them it is possible to estimate to a few thousandths of a degree, using proper precautions, but such thermometers are very valuable and at the present time they can not be replaced.

THE ELIMINATION OF SHORT WEIGHT AND MEASURE

By ARTHUR MCWILLIAMS, *Chief, Division of Dairies and Foods, State of Ohio*

The accuracy of a weighing or measuring device never has nor never will mean anything to the class of dealers in commodities who are willing to chance violation of the law for the purpose of obtaining added financial gain by defrauding their patrons. We

may spend hours of strenuous labor endeavoring to eliminate an error of a fraction of an ounce in some commercial establishment while brazen swindlers are stealing thousands of dollars from the public by questionable methods.

I shall outline briefly our investigation and prosecution of persons engaged in the practice of three different kinds of fraud in Ohio, by the operation of which the general public suffered a loss, conservatively estimated, of $1,000 daily. The first of these was the gigantic oil frauds conducted by wholesale and retail concerns selling lubricating oils at Cleveland, Ohio. This city contains more than 200 companies selling this product, of which approximately 15 really own or possess any stock of the commodity which they sell. The remainder depend upon wholesale establishments to fill their orders and make shipment. It may be safely said in passing that not more than one in a hundred of these purchasers throughout Ohio remeasure the barrel of oil they receive. Wood barrels and steel drums are used for shipping the product to the retail trade and an average of 800 barrels are shipped from this city daily.

The common practice of many of these concerns was to over gauge the container. Twenty-nine gallons was the usual amount put in barrels or drums of 30-gallon capacity and the contents were marked as 34 gallons. Hence, the innocent purchaser paid for the gallonage indicated, which, in fact, was 5 gallons more than the actual amount shipped.

Seventeen of these companies were prosecuted, and in all the cases filed not one was contested. The State compelled a refund to Ohio purchasers of the amount of this shortage; consequently, more than $19,000 was returned to their patrons. The wide publicity given these fraudulent practices through the cordial policy of the press served as an effective remedy, a complete and detailed exposure of the unfair methods used being broadcast.

The next item coming under our observation relates to the illegal sale of gasoline at filling stations in the city of Toledo. By chance it was developed that this particular activity had become organized by a number of operators, and that the members were schooled by an expert in the manipulation of the automatic pump. You will no doubt agree when I say we can test, adjust, and seal the measuring device, but we can not adjust and seal the person who operates it. Let it first be known that the conditions which existed in this city and the short measuring of gasoline which was being practiced in almost all sections of the State at the time were not due to faulty devices used and the short measuring was not done at the behest of the companies which owned the stations.

A general raid was decided upon, and I shall outline the manner in which we operated: All possible suspicion was removed from the mind of the station employee by securing a coupé, constructing a 3-gallon tank under the seat of the car as a fuel container, and setting the regular gas tank at such an angle that the special drainage pipe running to the rear of the car would quickly and completely empty it. We then employed a lady detective to drive the decoy car and make the purchases. Tennessee auto licenses were used, and each running board was loaded with luggage to give the tourist appearance as much as possible.

The city sealer, with his assistant, planned a route each day and tested and sealed the pumps at the various stations just before the purchases were made. The detective followed the route of the sealers, and two reliable citizens, members of the local auto club, were near the stations when the purchases were made by her, and after the test car left the place of the transaction they assisted in measuring the amount bought, using an approved 5-gallon liquid test can. One hundred and eleven 5-gallon purchases were made, of which 36 were within 1 pint of being correct and 75 were decidedly short. As low as 3 gallons and 1 pint was received as and for 5 gallons. A total shortage of $48\frac{3}{16}$ gallons was observed in the 555 gallons requested and paid for. Nineteen of the station operators were prosecuted in the municipal court, and immediately discharged by their employers. One member of the organization admitted his daily "rake-off" was $10.

This method of checking dealers was extended to other cities within the State. In each instance we received the assistance of the local auto clubs, and the investigations resulted in 37 arrests in Cleveland, 29 in Akron, and 15 in Columbus. This experience demonstrated the futility of testing and sealing devices under the belief that they would thereafter be properly manipulated.

The last item for discussion pertains to the millers, or those engaged in packing flour for commercial distribution. In a spirit of fairness we must observe the weight of this commodity is subject to considerable variation on account of moisture content, and, again, not many mills are equipped with scales that will weigh with accuracy because of vibration of machinery.

In approaching the subject of weight deficiency in flour we are usually confronted with the miller's first defense, that of "unavoidable shrinkage," which depends materially on the age of the flour and storage conditions. Taking this into consideration, our first move was to inspect and test the weights of the product recently packed in the mill and weighed on the miller's scales. This revealed the practice of weighing gross and marking net. In some instances we found as much as 6 ounces spilled or deposited on the scale platform and being reckoned as a part of each bag packed. In some localities we encountered price wars and dealers in their eagerness to meet competition purposely packing eighth-barrel bags 2 pounds short. Three carloads condemned by our sealers indicated an average shortage of 14 ounces on 24½-pound bags, although they had been packed only five days. County and city sealers throughout Ohio were instructed to reweigh flour found in stores and make check weight sheets on all stock that had been on hand less than 10 days. The shortage that this general survey brought to our attention was indeed surprising, and as these delinquencies were traced back to the manufacturer or packer, one of three contributing factors was usually found to prevail—gross packing, careless manipulation, or faulty devices.

In conclusion I may say to the extent avarice in mankind has the greater appeal, in an equal measure we may expect mercenary practices in commercial dealings. However, the incidents herein related had a decidedly salutary effect on trade practices in Ohio.

DISCUSSION OF ABOVE PAPER

Mr. Egan. Were you able to determine what method the operator used to give short measure? You did not bring that out. Assuming that the pump was accurate, were your officers able in any case to determine just how the fraud was perpetrated?

Mr. McWilliams. I could not explain their exact method of operating the pumps, but in some way they made it appear as if they were operating it to full capacity, but were not.

Mr. Egan. Then the assumption was that they did not run that piston to the top stop. In Connecticut, if we know that the pump is correct, we try to find out if the operator did not run the piston to the top on a 5-gallon order. Our weights and measures officials are supposed to operate the pump after they make a purchase to see if it could be so operated as to give the correct amount. We do that in all cases where we find any short measure. Very often the officer is able to tell, without looking, that the pump has not been emptied. I remember one time we were about 2 quarts short on 5 gallons. We immediately operated the pump in the ordinary manner and found that it gave full 5 gallons. Of course, we had a prosecution.

(It was moved and seconded at this point that the conference adjourn; the question was taken, and the motion was agreed to.)

(Thereupon, at 3.55 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m., Wednesday, May 28, 1924.)

FIFTH SESSION (MORNING OF WEDNESDAY, MAY 28, 1924)

The conference reassembled at 10.10 o'clock a. m., at the Bureau of Standards, William B. McGrady, first vice president, in the chair.

The Acting Chairman. Gentlemen, the meeting will please come to order. As we have the esteemed honorary president of our association with us this morning, I will ask him to take the chair for this morning's session.

(Dr. S. W. Stratton, honorary president, assumed the chair.)

ADDRESS BY THE HONORARY PRESIDENT, DR. S. W. STRATTON

Gentlemen: It seems quite natural to be with you. During the past year, and since I have been away from the bureau, I have come to appreciate your work a great deal more than I did. We often appreciate things more from a distance than we do when we are closely associated with them.

It is exceedingly gratifying to me to see the original purpose of the conference being carried out. It was the dream of Mr. Fischer and myself, and our associates, that this conference should be the clearing house for matters pertaining to weights and measures, inasmuch as it was not practicable for all of you to have scientific apparatus and scientific bureaus at your disposal. Some of the more fortunate have. It was not possible for us, under the laws, to do anything more than serve as a guide, which in the long run has been, I think, a very wise method of procedure. As all of you who have been coming here know, the bureau has never undertaken to do more than this, and to be the means of bringing you together where you can compare notes. That last feature of it has become more and more important, since this has gradually grown into a meeting such as is held by nearly all branches of industry and by all kinds of professional men—namely, a conference where you can compare notes and exchange ideas.

Now, you are doing more for weights and measures in one year by a conference of this kind than you could in a score of years without it. Things move very rapidly here, while you would wait a long time to find out through the regular channels what other people are doing. That would be too slow a process, and we have many examples to indicate this. I recall several of them. For instance, the gasoline pump came into use very rapidly. The first year it came up we knew very little about it. Shortly thereafter specifications and tolerances were asked for. At a third meeting we were working on specifications and tolerances. By that time many of you came with much knowledge based on practical experience, which you were ready to contribute to the work of developing a proper code.

There is another thing which has pleased me and is quite in accord with what is being done elsewhere, and that is the giving of this information, the result of your experience, to the makers of these devices. There was a time when competing manufacturers never cooperated with each other in any way, but while they still compete in industry to-day, they frequently employ some agency to get at the fundamentals which are of interest to the industry as a whole. We have had many instances at the bureau where competitors have contributed for a research which, when carried out, gave results which would be of benefit to all of that industry. There was, however, still competition in the application of those principles. So it is in the case of weights and measures. You have established by this conference the essentials—the specifications—which are open to all the manufacturers. They can take advantage of that, and the maker who meets those specifications in the best and most convenient way and obtains the most practical appliction will win out. Therefore, this getting together and arriving at the fundamental facts helps the whole industry. It helps all those who are interested in the making of weights and measures, for instance, while it does not destroy competition. Your field is going to grow. I have often said it. I have taken advantage of every meeting to keep that fact before you.

In many cases you are now handling things that a few years ago would have seemed altogether out of your line. There is no reason why your office should not grow into the office which handles the general question of standards—even standards of quality—in the State. This may be a long way off, but it is coming, and this contact with the bureau and contact with each other is the thing which will carry you safely through. It could not be done otherwise. You could not take up and handle a great many things should they be handed to you, without the assistance of the Bureau of Standards, which is the center of measurement of standards of all kinds.

I am greatly pleased to be with you this morning. I remember this work as one of the very first activities of the bureau and one of its very first efforts to get in contact with the country. We felt that the bureau could be useful to the country at large in weights and measures matters, and that it could work through those who administer the various State and city laws. We have always enjoyed this contact.

I have taken as much interest in this as in any conference ever held at the bureau, and the same has been true for Mr. Fischer and his successors. They are all interested in your work. I know that it is now, as it was in the past, that you can come any time to the bureau and receive its support.

Your offices are often political; necessarily so. The government of a State or city must be given over to those who are in charge. They may, or may not, be posted in regard to particular things, but they must assume the responsibility. Now you have the backing of the conference. If your acts have followed the conclusions of this body and your regulations have been based upon the things you have found good, it will be very difficult for a new man to come in and deliberately tear up things through ignorance. If he does it for other reasons, there is no excuse; but you will not find that very often. It is mostly done by some one who thinks it is a new thing;

who thinks, "Here is a chance to make a reputation." It is all right, it is a very good ambition, but it should be followed along the lines of correct decisions, correct laws, and the truth.

Now, you are getting at the truth in regard to weights and measures in these conferences. You are getting at it in many ways, and your rules and regulations are based upon the facts which you have found out in your work. The people in the bureau who are cooperating with you in regard to standards form the strongest backing and assurance that you can have. Your head officials will come and go, but your weights and measures work will go on forever, for if it is based on the right principles it will be very difficult to sidetrack.

I am very sorry that I could not be present the first two days of the conference and listen to some of those discussions which are becoming more and more interesting and more important every year. I read with great satisfaction this morning the results of your discussions. That goes all over the country; it starts people thinking. You have done a great work if you go no farther, but you will not stop here. Your work will grow and grow until you get the right things. I thank you very much for your attention.

PUBLICITY AS A MEANS OF INCREASING COOPERATION AND EFFICIENCY

By Charles H. Bulson, *Sealer of Weights and Measures, Jefferson County, N.Y.*

Mr. Chairman and gentlemen, I do not come to bring you anything new. I will try to revive in your mind certain fundamental truths regarding publicity, not played out, not yet played in, endowed by destiny. Our subject, "Publicity as a means of increasing cooperation and efficiency," naturally divides itself into three important sections or divisions: Publicity, the means employed, and cooperation and efficiency, the two ends to be attained.

The very nature of the subject indicates an active campaign of advertising to the end that the purchasing as well as the selling public shall work together for the purpose of increasing efficiency, ultimately bringing justice to all. Advertising is the method by which the producer of commodities disseminates information regarding them. This advertising has been brought to a high state of efficiency, as evidenced recently with the stoppage of newspaper advertising, when the sales of certain articles dropped 90 per cent. The American buyer has come to regard newspaper advertising as so much news. Deprived of her store news the housewife is at sea regarding purchases. To make proper use of this fact is of great value to the sealer of weights and measures.

Publicity, another name for advertising, to be effective must be of such a nature as to secure the attention of all classes which this department serves, and as such secure action. Since the results to be secured are cooperation and efficiency, the people served must cooperate, and to that end must be made to see their duty and responsibility and serve it. Cooperate, as defined by Webster, is "to act jointly with another, or to concur in action, effort, or effect." Cooperation, therefore, should be everything that its meaning implies. We find that cooperation in action is as old as history itself, dating back to the time when the walls of the sacred city fell at the

shouts of men. Here, too, we find publicity voiced in the shouts of the assaulting party. Our own form of government is but the result of combined efforts—cooperation and efficient management of means at the command of efficient leaders.

Just recently we find the bonus bill passed by the cooperation of party leaders, through the efforts of the press, educating those in authority. One person alone can not manage and carry into effect, single handed, reforms or reform principles affecting localities, States, or a Nation. The people must be made to consider the matter, and the quickest and surest method is through the printed medium, the most powerful part of which is the public press. It has been well and aptly said that water will reach its level and will rise no higher than its source. So our efforts as sealers will not get above our aims, ambitions, or desires.

To the thoughtful sealer of weights and measures this question ever occurs: "What am I here for? What is the object of the work, and how shall I attain that object?" The answer is, "To secure a square deal, with just weights and measures to all parties concerned, at all times, everywhere." The sealer of weights and measures must learn to read human nature, and after having done this to take advantage of the facts in his possession. The average merchant means to be honest, and it is the exception to this rule which causes the weights and measures officials concern. Many offenses occur through ignorance of the law or its application. Right here publicity steps in to aid the sealer. I, personally, make free use of the public press, and once a week, or oftener, if occasion requires, cause to be inserted items of interest affecting the merchant from a legal standpoint.

Results of such action were quite apparent when on one occasion I caused a huckster to be summoned to the bar of justice, and he then and there plead guilty to the charge of selling a short-weight peck of onions. He delivered 12 pounds of onions for a peck, whereas the peck of onions by New York State law must weigh 14½ pounds. The reporters of several newspapers caused to be published an account of the affair, calling attention to the fact that weight and not measure was demanded in the sale of dry commodities. Immediately following this prosecution all hucksters who were selling by measure at once procured scales and sold by weight only, not only in my own county but in adjoining counties. Right here let me say that I believe that dry measures should be eliminated entirely, and such goods usually sold from dry measures sold by weight. No merchant in Jefferson County, N. Y., sells vegetables—potatoes, onions, or like commodities of any sort—by measure. They are sold by weight and, of course, bought by weight.

In the case just cited the news item secured at once results in the line of cooperation from all concerned, informing dealers at one stroke just what was expected of them, thereby getting results with least expenditure of thought, time, and money. Dealers, as a rule, are square, and the average dealer, if treated squarely and fairly, is the best friend of the sealer. So long as he is justly treated he recognizes in the sealer his best protection against mistakes, misunderstandings, and trade abuses. As a rule, when merchants learn what proper inspection means they clamor for more. The annual report of the sealer usually emphasizes the number of crooked deal-

ers who have been caught, no mention being made of the 90 per cent or more who try to be honest, square business men.

There is another type of cooperation which I desire to mention briefly. It is that between the State department and the local sealer. The county has a right to expect cooperation from the State and the State from the county. It is an easy matter for a State department to note from reports, correspondence, and other sources the activities of the sealer, just what the local sealer is doing, and the State department should never become vexed if a local sealer keeps its stenographers busy, and should be ever ready to lend a helping hand, giving the sealer full benefit of all its knowledge and experience. I believe that the State department of every State should annually call together all local sealers and weights and measures officials, and discuss with them all the problems which are ever present and have to be contended with. In New York State we have the State association of sealers of weights and measures, which annually holds a conference, discussing, pro and con, questions of vital importance to sealers and weights and measures officials generally. To these conferences, all State officials are invited and given a place on the program. The State officials are consulted in arranging the program, to the end that questions touching the work of the majority of the sealers may be discussed. We usually conduct at one session of the annual meeting an open forum, where any subject relating to weights and measures may be freely discussed.

Between the New York State Department of Weights and Measures, and the New York State Association of Sealers of Weights and Measures, the closest kind of cooperation exists. An example of this is seen in the passage of the New York State bread law recently signed by Gov. Alfred E. Smith. The State department of weights and measures sent telegrams to every sealer in the State, when the bill was introduced, urging the sealer to get his senator and assemblyman to favor the bill; and when the bill came up for final hearing, a delegation of the officers of the State association of sealers appeared in support of the bill before the governor, urging him to sign the measure. Thus do our State association and the State department of weights and measures work hand in hand.

We now come to the last phase of the work, efficiency. Efficiency is the ratio of what is being done to what ought to be done. To get results we must get close to the public. The prevailing idea that efficiency means hard work is entirely wrong; the most efficient man usually is not working hard. The efficient man is one who gets a lot of return for a little work. Most men who are exceedingly strenuous are not highly efficient at all, and the fellow who hustles through his work, driving himself and others to greater exertion, or who does for himself work which is already being done by others who could furnish him with their knowledge and experience, never attains high efficiency. He gets too little out of what he puts in. His results are low in proportion to his expenditure of time and effort. It is for this reason that the constructively lazy man is apt to be most efficient. His brain works overtime to devise ways and means to save effort, and economy of effort is a great step toward high efficiency. The man who gets the maximum of result with the minimum of effort is efficient. He has considered his job and planned his work so that results are accomplished with no

waste of time or energy, or duplication of work. The bigger his job, the wider his influence and the more important his decisions, and this leads us to the necessity of some source of authentic, unbiased news of what is being done in the weights and measures world. This publicity is to be obtained in the public press.

In conclusion, permit me to say that the time appears to have arrived when we may more properly look to the people, where natural laws may well be left to supplement artificial laws. In complete freedom of action the people oftentimes have a more effective remedy by publicity than can be supplied by bureaucratic supervision. We do not need more government, we need more culture; we do not need more laws, we need more cooperation; and to this end publicity and efficiency work hand in hand.

The Acting Chairman. Is there any discussion of this paper? The paper contains a great many good suggestions. I have often felt that the officials within a State could profitably follow the example of the national association. I know of a great many organizations that have followed this one. It is a splendid thing. By getting together and comparing notes they do a great deal in promoting uniformity and efficiency in the State.

METHOD USED IN THE CALIBRATION OF VEHICLE TANKS IN THE CITY OF DETROIT, MICH.

By George F. Austin, *Sealer of Weights and Measures, City of Detroit, Mich.*

Mr. President, members of the conference, and visitors: Before attempting to outline the method used by my department in the gauging and control of vehicle tanks, so-called, used in the sale and delivery of petroleum products in the city of Detroit, I wish to thoroughly impress upon your minds the fact that the proposition of inspection and regulation of vehicle tanks was placed before me by the councilmen of the city of Detroit on petition of a number of owners of gasoline distributing stations, and at a time when, so far as I could learn, there was no other department in the country performing a like service.

I drew a general outline of an ordinance and invited the managers of the various oil companies then operating in the city of Detroit to confer with me on the same, and as a result of this conference our present ordinance was submitted to the councilmen of the city of Detroit and approved by that body on February 2, 1920. I will ask your indulgence for a few moments in reading to you the ordinance under which I operate, which is being enforced in the city of Detroit with gratifying results to all parties interested.

COMPILED ORDINANCES OF THE CITY OF DETROIT, 1920

CHAPTER 5, ARTICLE 8

Section 1. Every person, firm, or corporation engaged in the sale or distribution of petroleum products through tank wagons or other conveyances within the limits of the city of Detroit shall cause the compartments of the tank or tanks of said conveyances to be gauged and sufficient gauge sticks to be provided. For the purposes of this ordinance the tank or compartment shall be deemed to be full when the contents are flush with the bottom of the dome. The capacity of the respective compartments in gallons and the total capacity of tank shall be painted or lettered in a conspicuous and appropriate place on the side of the tank.

SEC. 2. The gauging of said compartments shall be carried out in the presence of the sealer of weights and measures of the city, who shall stamp his approval on the gauge stick, which stick shall be graduated on a 5-gallon basis. An approved gauge stick for each compartment shall be carried on every tank wagon at all times.

SEC. 3. When gauged as aforesaid and approved by the sealer of weights and measures of the city, the tank or the compartments thereof, respectively, shall be considered standard measures of the capacity indicated; and deliveries of full-compartment quantities may be made by means of a hose or piping, and it shall be the duty of the driver or chauffeur of the tank wagon in such cases to see that the tank or compartment is full before such hose or pipe delivery is commenced, and that the entire contents of tank or compartment is delivered. Deliveries in less than full-compartment loads shall be made only by means of buckets or measures tested and approved by the sealer of weights and measures.

SEC. 4. The driver or chauffeur of each tank wagon shall carry with him a certificate signed by his employer showing the quantity and trade name of the product loaded into each compartment of his tank wagon before any sales or deliveries are made, and as such sales or deliveries are made he shall write a ticket or memorandum showing the trade name and quantity of the product sold or delivered, the name of the individual, firm, or corporation to whom such sale or delivery is made, the date of such sale or delivery, and the identifying number of the wagon. Such ticket or memorandum shall be signed by the driver or chauffeur, and the certificate and ticket or memoranda shall be exhibited to the sealer of weights and measures of the city or his deputies at any time upon request. It shall be the duty of the employer to furnish the driver with the certificates and tickets above mentioned.

SEC. 5. It shall be the duty of the sealer of weights and measures of the city to inspect, or cause to be inspected from time to time, such tank wagons and to verify the gallonage sold or delivered, by examination of said certificate and the tickets or memoranda referred to in section 4 hereafter or by such other means as to him may seem advisable.

The method of inspection and calibration of vehicle tanks in use by my department is as follows:

First. We inspect all faucets to ascertain if they are functioning properly to insure accuracy in determining measurements.

Second. We inspect the inside of each compartment and all piping leading therefrom to ascertain if a proper drainage may be had from each compartment and to locate a proper and level space at the bottom of the tank from which an accurate measurement may be determined.

Third. We require the tank, including all piping leading therefrom, to be filled with water to a level with the bottom of the dome (shell full). Water is used as a testing medium, because it is believed to be the least susceptible to changes in volume due to temperature conditions. The tank or truck is then placed on a level surface and convenient to a drainage system, providing a ready means of disposing of the water as it is drawn from the tank. The owner is required to furnish a hardwood stick three-fourths to 1 inch square, of proper length and dressed on all sides to receive the 5-gallon markings as found by the inspector.

Fourth. The gauge stick is inserted through the filler opening until it engages with the bottom of the tank. The stick is then marked at the water level for capacity load, and the distance from the bottom of the gauge stick to the capacity marking is then carefully measured and noted on our record. A 5-gallon quantity is then drawn from the tank and the gauge stick is again marked at the water level thus found. The water level in each case is found by means of a special instrument having a wire base at right angles to the perpendicular, this instrument being slid downward on the

gauge stick until the wire comes in contact with the surface of the water; then by using a hacksaw along the edge of the wire and across the stick we make the permanent 5-gallon markings.

This process is repeated until the tank has been entirely emptied. If the last amount drawn is not an exact 5 gallons, the amount is carefully measured by using smaller measures to determine the value of the space from the bottom of the gauge stick to the last marking. This last determination is made to the nearest gallon, viz, anything less than a half gallon is disregarded, while a half gallon or more is considered as a full gallon.

Two inspectors are required for the inspection of a tank under this method—one to draw and carefully measure each 5 gallons of water from the tank, using measures which have been inspected and corrected to the degree of accuracy required for office standards, the other to determine the various water levels and mark the gauge stick as each 5 gallons is drawn from the tank.

The owner is required to stamp with a steel die the value of each 5-gallon marking for each compartment represented on the gauge stick, immediately above the various markings. He is also required to furnish a brass or copper plate about 6 by 4 inches upon which is stamped the company's name or trade-mark, the number of the tank, the capacity in gallons and designating mark for each compartment, and the total gallonage. The gauge stick and plate are then submitted at my office for inspection and approval, are compared with our record, and if the markings are found to be correct we attach our official stamp, showing the date of inspection, at both top and bottom of each compartment measurement. The plate is stamped in a similar manner and required to be brazed on the right side and near the front end of the tank as a permanent identification.

A measurement accurate to the nearest one-sixteenth inch is taken of the length of each 5-gallon marking for each compartment. A duplicate record is made of these measurements, one copy being retained for my office records and one copy furnished to the owner of the tank to enable him to make a new gauge stick should the original be lost or broken, without a regauging of the tank.

During the past three and one-half years we have inspected 493 tanks, ranging from 400 to 2,500 gallons each. During the same time we have complied with requests for regauging 20 tanks. This work has been carried out by different inspectors from those making the initial inspection, with the following results:

Total gallons in tank	Difference found in various compartments				Total gallons in tank	Difference found in various compartments			
	1	2	3	4		1	2	3	4
	Gallons	*Gallons*	*Gallons*	*Gallons*		*Gallons*	*Gallons*	*Gallons*	*Gallons*
890	0	0	0	−1	719	+1	0	+1	
898	0	+1	−1	−1	652	+2	+2	+1	
874	−2	−2	−3		715	+1	+1	0	
415	−1	+1	0		712	+2	+1	0	
656	−1	0	0		431	−1	0	0	
897	+1	+1	0	−1	715	+2	+1	+1	
2,472	0	+2	0	−5	1,014	0	0	0	
664	0	0	0		1,036	+2	−1	+1	
550	−2	−1	−3		1,596	−1	−1	−1	−1
439	+1	0	0		690	+1	+1	+1	

The result of the above reinspections shows that differences of 30 gallons minus and 29 gallons plus were found in the 65 compartments reinspected. Obviously, the 5-gallon error found resulted from a miscount which would be discovered under the present method.

The provision which requires the gauging of vehicle tanks and gauge sticks on a 5-gallon basis necessarily involves some extra work, but the presence of a properly calibrated gauge stick, together with the certificate showing the composition of the original load and the delivery slips, furnishes a ready means of checking upon the street the load at any time and furnishes a complete check upon the accuracy of the final inspection, which is exceedingly desirable when you consider that the result of the inspection is to be accepted as final and used as the basis for measurement throughout the life of the tank.

We have had prepared blue prints of the instrument used in determining the various water levels for the calibration of the gauge sticks, and I will be glad to send a copy to anyone interested.

DISCUSSION OF ABOVE PAPER

Mr. Payne. I would like to ask if you ever compute the capacity of those tanks by weight of the contents?

Mr. Austin. No, sir; I have never undertaken to calibrate them by weight.

Mr. Buchanan. Do I understand that you compute the capacity of the pipe lines in your measurement?

Mr. Austin. Yes, sir; it has been our practice to include the volume of water contained in all the pipe lines leading from the tank. We did, however, when we first started this work, in the case of some tanks that were equipped with safety valves or emergency valves, measure the tanks excluding the capacity of the pipe; but we eventually gauged those tanks including the pipe lines, because we found that the emergency valves were almost invariably disregarded by the companies in the transportation and delivery of their petroleum products. They merely make use of the emergency valves in case of an emergency, such as an accident involving the knocking off of one of the delivery faucets, to prevent the flowing of the whole capacity of the tank upon the streets. When we calibrated them by the first method, it resulted in our finding tanks on the street with the level of the liquid below the proper filling point due to the filling of them with the valves closed, after which they were immediately tripped, allowing the pipes to fill up and the level of the liquid in the tank to drop.

Mr. Buchanan. In the certificate which you issue, is the name of the manufacturer of the tank included?

Mr. Austin. No, sir; the only thing we are interested in is the securing of some permanent identification of the tank, and all we require in addition to the volume in gallons and the designating mark is the name or trade-mark of the company using it.

Mr. Maroney. Are these measuring sticks used to sell by?

Mr. Austin. Our ordinance specifically states that in partial compartment sales buckets or measures tested and approved by the sealer must be used. It was the intention to prohibit the use of the gauge

sticks for this purpose, but we do know they are so used in many instances, and we have never undertaken to stop that practice or to prosecute anyone for so using them. This is because we feel that the stick is a measure in a sense, and since we have used such care in calibrating them we feel that they are just as accurate a measurement as we could get.

Mr. MATHEWS. I would like to say we have had some experience in the gauging of tank trucks. We find that all filling at the stations is done with the truck standing on a level surface, so in calibrating the vehicle tanks of the various oil companies we do it on the level. Some of them want us to jack up the front end to drain the pipes during the test. Of course, we are not willing to do this, because they do not do that in filling the dealer's underground tank. In making a delivery the truck is ordinarily level, and consequently they would not empty all of the fuel oil or "gas" which a tank is supposed to deliver if in the calibration one end of the tank had been raised. The pipes may hold several gallons that will not drain out on a level. After calibration we mark on the tank the capacity load of each compartment, so that if a dealer buys a solid load he can be advised what each compartment holds.

Mr. AUSTIN. I might say in connection with that that we have had one or two requests to regauge tanks owing to the fact that the companies claimed they were unable to get an entire emptying of the tanks. We gauge with the truck standing on the level. They claimed that their customers were wise enough to insist upon their jacking up the front end of the truck or driving on an incline, whereby they would get a complete drainage of the tank, and as a result they were losing whatever volume of gasoline they were able to get out in that manner. They requested the retesting of the tanks using that process. My reply was that I would defer reinspection until they had rebuilt the tanks so as to permit proper draining on a level surface.

The ACTING CHAIRMAN. Are these tanks used in the dispensing of gasoline to parties who have underground tanks?

Mr. AUSTIN. Yes, sir; they are used by the oil companies in furnishing their own stations and likewise all the filling stations that are within the city.

The ACTING CHAIRMAN. In furnishing their own stations, why should they want to know the capacity of the tanks?

Mr. AUSTIN. They want to keep as close a check on their gas stations as possible, and it is necessary to do this if they want to remain in business very long.

Mr. SIREN. Mr. Chairman, most of the tanks are either cylindrical or oval. Would it not be possible in putting the stick down to put it in a sloping position, so that there would appear to be a greater depth of gasoline in the tank than is actually the case?

Mr. AUSTIN. We anticipate that the average inspector detailed to the work of inspecting these tanks will ascertain where he can get a permanent and a satisfactory position for the stick and mark this position on the openings.

Mr. SIREN. If you let the stick remain too long in the tank, the gasoline will "creep" up the stick.

The Acting Chairman. I would like to ask you about what the accuracy is. Suppose you have a stick that is accurately graduated, and several individuals make the same measurements; how nearly would they be alike?

Mr. Austin. At the full capacity you would not be more than one-half gallon in error, but at an intermediate point, such as at the center of the load where the cross section of the tank is largest, even one-sixteenth of an inch in measurement might result in 1 gallon difference from the actual measurements, and you might get such an error. For instance, I have a gauge stick calibration record here which shows that on this particular compartment, which had a total capacity of 202 gallons, 5 gallons was represented by a height of one-half inch at the middle of the tank, while near the top 5 gallons made a difference of $1\frac{7}{16}$ inches in the liquid level.

Mr. Mathews. We find it is very difficult to estimate accurately in the case of large tanks at the point of maximum cross section. In some tanks, at the middle, one-quarter inch represents as much as 5 gallons. The error on compartments of 200 to 300 gallons capacity would not be more than 1 gallon.

The Acting Chairman. That is more nearly accurate than I would have thought.

Mr. Kanzer. Have you had any experience with drivers who, having withdrawn a certain number of gallons from the tank, delivered the balance for the full capacity?

Mr. Austin. Yes; we have. It not infrequently happens that our inspectors upon intercepting wagons on the street find a driver who has his memorandum of sale for an entire load, but who still has a quantity of the load remaining in his tank. We are able to deal with him. In one such instance a driver had a receipted bill for the entire contents of his truck and had a full compartment left. It transpired, when we took the matter up with the purchaser, that the firm had a discrepancy in measurement of something like 10,000 gallons in the previous six months. Our method enables us to check up such cases and assist the business people in securing an honest measure.

Mr. Winchester. This discussion has brought out this fact, that the errors mentioned are based on 1,000-gallon tanks. The average compartment of a 1,000-gallon tank would hold about 300 gallons. I think it would be well for us to take into consideration the number of 1,000-gallon tanks in the country as compared with the number of smaller tanks ranging from 270 to 650 gallons capacity. The percentage is very small; therefore, the percentage of error in the smaller tanks must be materially smaller than the percentage of error stated in this case.

Mr. Mathews. It has been said that the driver may sell off possibly 10 or 15 gallons and then sell the balance to another dealer as a full compartment. In this relation the purchaser must do his part. These truck drivers are required to carry delivery sheets showing every delivery. If the driver says he has a full compartment, the purchaser can look in the compartment to see that it is full, and it is his duty and his privilege to do this. He should also ask to see the sheet for the compartment, and this will show whether some has been drawn off.

REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES ON SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS, PRESENTED BY F. S. HOLBROOK, CHAIRMAN

Pursuant to the instructions of the conference, your committee on specifications and tolerances last year brought in a report on specifications and tolerances for vehicle tanks. On account of the press of other business this report was not discussed in full.

In view of this your committee suggested that in order to get the report formally before this body the specifications and tolerances as proposed be tentatively adopted by the conference with the understanding that they were then to be negotiated with the various officials, with users of vehicle tanks, and with manufacturers of vehicle tanks, and the whole code put into final form, if possible, for presentation for final adoption by the present conference.

Shortly after the last conference adjourned these specifications and tolerances were very widely circulated among the officials, users, and manufacturers throughout the United States, and requests were made for criticisms and suggested amendments. The committee received a large number of replies in which the tentative specifications and tolerances were criticized, and a study of the criticisms seemed to indicate that many of the objections were reasonable ones deserving careful consideration. In view of this your committee requested, by letter, that the manufacturers and users of vehicle tanks and officials come to the conference prepared to discuss these specifications and tolerances on the floor, and fully to present any criticisms or suggestions which they had to make to the tentative report. It was suggested that the matter would doubtless be brought up by the reading of last year's report, section by section, for comment.

Inasmuch as we anticipate, in view of our experience with this matter, that a large number of criticisms will be made, and inasmuch as we recognize the impossibility in the time available of making satisfactory amendments and completing the code this year, the committee on specifications and tolerances will be prepared to propose a motion to the effect that the specifications and tolerances, together with all criticisms of record, be referred back to the committee. It is our expectation that during the coming year the committee will be able to prepare a code which will be more favorably received by the various parties in interest than the present tentative code has been, for consideration at the next meeting.

Respectfully submitted.

(Signed) F. S. Holbrook, *Chairman.*
Wm. F. Cluett,
R. F. Barron,
C. M. Fuller,
Wm. B. McGrady,
Committee on Specifications and Tolerances.

CONSIDERATION OF TENTATIVE SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS

Mr. Holbrook. We have here a number of copies of the tentative code. Therefore, we can place a copy in the hands of each of you, so that during the reading you can follow the text very closely. We would suggest that after the reading of each section discussion be had

on that section. If that procedure is satisfactory to the conference, it will be in order to distribute these specifications.

(Copies of the tentative specifications and tolerances were distributed.)

The Acting Chairman. The secretary will read these specifications section by section.

Mr. Holbrook. I hope, Mr. Chairman, that it is well understood that the meeting is open not only to officials, but to users and manufacturers, guests of the conference, and anyone else who is interested; that they have the full privilege of the floor in this discussion. [Reading:]

TENTATIVE SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS (WHEN USED AS MEASURES)

[Adopted by the Sixteenth Annual Conference on Weights and Measures, May, 1923]

Notes.—The following specifications and tolerances shall apply to vehicle tanks and their accessory piping, valves, etc., in those cases in which the tanks or the compartments thereof are used or to be used as measures to determine the amount of liquid delivered, and such use shall be permitted only when these specifications and tolerances are complied with.

If a tank is damaged in any way (as from collision, etc.), or if repairs which might in any way affect the accuracy of measurement are made, such tank shall not again be used as a measure until inspected and, if deemed necessary, tested by the weights and measures official.

In determining or checking the capacity of tanks, water is recommended as a testing medium. Mineral oil should never be used, because the change in volume due to temperature variations is large, and evaporation of the oil during the test may result in very serious inaccuracies in the calibration.

It seems inadvisable for the committee to defend these specifications, at least to the extent of starting a long argument, because we will not progress so rapidly in that way, and the object of this discussion is to bring out objections to them. Of course, the committee is prepared to state what they have in mind in reference to the specifications whenever such a request is made.

The Acting Chairman. You have heard the reading of the "Notes." Is there any objection or any suggestion? If not, we will proceed.

Mr. Holbrook (reading):

Definition.—A vehicle tank, hereinafter referred to as a "tank," shall, for the purpose of these specifications and tolerances, mean a container, which may or may not be subdivided into two or more compartments, mounted upon a wagon or automobile truck and used for the delivery of liquids. The term "compartment" shall mean the entire tank whenever the tank is not subdivided; otherwise it shall mean any one of those subdivided portions of the tank which is designed to hold liquid.

Specifications.—1. All tanks and all indicators, piping, valves, etc., attached thereto and used in connection therewith, shall be of such design, construction, and material that they may reasonably be expected to withstand ordinary usage without impairment of the accuracy of measurement.

2. An indicator shall be provided which shall be centrally located with respect to the longitudinal axis of the compartment. The lowest part of this indicator shall clearly and distinctly define the height to which the compartment must be filled in order to contain its marked capacity. If this indicator is adjustable, it shall be so constructed that it can be sealed in such a manner that its position can not be changed without destroying the seal.

The Acting Chairman. You have heard those items. Are there any suggestions or objections or any questions you care to ask the committee?

Mr. Estes. Mr. Chairman, are these specifications retroactive in their effect?

Mr. Holbrook. Not as a rule. In the final report which the committee will make it will be recommended that certain specifications—certainly those designed to prevent the perpetration of fraud—be made retroactive. As a rule specifications will not apply to those tanks which are already in use.

Mr. Maroney. Would the filler opening have to be in the center of each compartment?

Mr. Holbrook. It is suggested that the indicator shall be centrally located with respect to the longitudinal axis of the compartment, and this would require the filler opening at some part of its diameter to be in the center. This is for the reason that accuracy can be more nearly obtained by this arrangement when the tank is not in level. Any type of indicator may be used which is strong enough to withstand ordinary damage and which is definite enough to establish a definite filling point.

Mr. Mathews. I feel that the first thread in the dome is probably as accurate an indicator as can be obtained in any tank wagon, and I have seen many tanks calibrated. I think a better opportunity is afforded for checking the amount of liquid in the tank by employing this method than by employing an indicator, since I feel that under certain conditions there would be the possibility of the indicator being damaged on account of the position in which it must necessarily be attached.

Mr. Austin. Mr. President, I might say that many of our regaugings have been made necessary by the fact that in our first inspections the tanks were filled to the bottom of the dome. In a large number of cases we have found that where the domes were small—6 or 8 inch collars 2 or 3 inches high, for instance—there was not sufficient space for expansion, which caused the tanks when properly filled to overflow their contents along the street. To have such a condition exist is very objectionable from a safety standpoint and very objectionable from the merchants' standpoint. Some companies having that class of tank have had the domes reconstructed and have extended the collar of the dome down far enough into the shell of the tank to allow sufficient room for expansion. Then we regauged those tanks, measuring to the bottom of this dome-collar extension. Technically that does not comply with our ordinance because the tank is supposed to be shell full, but in those instances where we found the size of the dome to be insufficient to take care of expansion we have permitted the reconstructed collar to provide room for expansion. Unless the tank has a large enough dome it would seem that some definite indication mark should be provided.

Mr. Winchester. Mr. Chairman, in a city like Detroit the oil manufacturers have changed the construction of their tanks so as to allow for the expansion, and in the city of Detroit we have very close supervision over the deliveries that are made. When a driver pulls up to a filler tank, he gets the correct amount in his tank because we have a man to check the filling. It is to be regretted that in all the smaller stations the filling can not be checked in the same way, but there are places where the seller and the buyer are entirely

dependent upon the man who fills the tank. Therefore, if he is supposed to fill to a gauge which is located down into the tank there is also the possibility that he will fill over that point. A practice which I have found to take care of expansion is to have the man who fills the tank fill to the prescribed point in the dome cover; after he has done that, in order to take care of the expansion, he will draw some off in a bucket and carry that along with his tank. When he goes to make the delivery, in order to satisfy the buyer and give him full measure, he pours it out of the bucket back into the compartment and the buyer is certain he has a full compartment.

The Acting Chairman. If the buyer does not check the capacity of the tank, does it sometimes happen that the amount in the measure is overlooked?

Mr. Winchester. The same thing would take place if you had a gauge in the tank. If the buyer does not check whether it is up to that gauge, he will get stuck on the method which we are advocating here. It is largely a matter of educating the buyer to observe what he is purchasing. There is no reason why, if we put a gauge in the tank and he fills to the gauge, the driver can not draw from it and the buyer get cheated. Probably this is more likely to be the case than if the method of filling to the thread in the dome cover is followed. By the method of filling to the gauge in the tank there is the possibility of cheating the seller by the driver. The method we have pursued protects the selling company. It is up to you to educate the customer to look at the contents which he is getting in the tank, and the public is very careless in that matter.

Mr. Holbrook. My thought is that the separation of a small quantity from the larger quantity in every case might suggest to the driver that the smaller quantity could be readily "gotten away with," to use a slang expression.

Mr. Winchester. Just look at it from another angle. When we put in an indicator the driver draws from the tank on a warm day to prevent overflowing. He goes to the customer and he finds that an expansion has taken place. The customer and he look at the gauge. He will not give the customer any more gasoline than to the indicator point; he will keep the difference for himself.

Mr. Holbrook. In these deliveries it has never been found practicable to allow for temperature variations, and the only requirement has been that full gallonage be delivered at the temperature at the time of delivery. It has been stated that sometimes the gas expands over the indicator. What is done in the winter time when the temperature falls and the gas drops below the indicator? There is no additional supply in that case which can be put in to fill the compartment up to the indicator.

Mr. Winchester. It is seldom that a tank goes out and makes full-compartment deliveries of all the compartments on the tank. If we were delivering gasoline to you, and due to the temperature the gas falls below the indicator, we would break one of the compartments and fill to the indicator and give you full measure.

Mr. Holbrook. Would the driver be compensated for that shrinkage that takes place?

Mr. Winchester. That is a matter for adjustment between the company and the driver himself.

Mr. Holbrook. Do you know anything of the practice? I am merely trying to develop these points which come up.

Mr. Winchester. I can not see where that particular thing enters into this discussion.

The Acting Chairman. I did not think the expansion or contraction would be a very large amount.

Mr. Farnum. In my 36 years of experience—I come from New Jersey—we fill to the bottom thread of the dome as has been suggested. We have a rule, suggested by Mr. Austin, of Detroit, that no fractional part of a compartment may be hosed off. A driver is subject to dismissal if he does so. We do that to protect the buyer. We try, through publicity, to get the buyer to see that each compartment is full. The slight variation which might be made in the volume due to temperature is so slight as to be hardly worthy of notice. In extreme cases on an especially warm day, as the inspector states and as Mr. Winchester suggests, the driver will draw off a sufficient amount of the product into a can to prevent overflow, but we instruct the buyer to see that the compartments are full. I find in most instances that when the station operator is busy he makes the driver "flash" the compartment—an expression which they use. He will take his hand, put it in the dome cover and "flash it." He wants to know if the compartment is full. It has to be full. If it is not, some allowance must be made for it. He will not accept anything unless it is full. If you legislate against the carelessness of the buyer by requiring indicators it will work very harmfully against the distributor and the buyer. If the man buying the goods is not sufficiently interested to see that he gets what he pays for, I do not see what can be done. Our practice in the filling and gauging of motor vehicles has been the same as outlined by the inspector from Detroit. We have tables of contents similar to those in Detroit, which are kept in the office. Harry Foley, superintendent of weights and measures for the State of New Jersey, is here and can confirm that our compartments are all marked and indicated, and we have never had a request for the remeasurement of one of our compartments. The buyer can see what he gets, and the fact that we have never had a request for a remeasurement is due to the fact that we insist that a man must receive a full compartment. If a compartment is only partly full, it must be bucketed off. That is the only safeguard to protect the buyer.

Mr. Schwartz. We have not gone very deeply, as yet, into this subject, because requests have not come in, and we have practically taken the measurements as given by the various delivering companies.

Mr. Austin. Mr. Chairman, I just want to add that a very large proportion of the deliveries are made by full tank wagons or full compartments instead of partially filled compartments. I think it would be a wise thing to have a provision incorporated in our specifications requiring that sufficient dome space should be built upon every tank wagon to take care of the expansion and let them fill to the bottom of the thread. That would be the most feasible—to compel them to put a dome of sufficient capacity to take care of such expansion.

Mr. Holbrook. It has been my observation that the domes are getting smaller year after year. Of course, these specifications do

not contemplate that a tank shall necessarily be calibrated "skin full." An expansion place may be provided other than a dome.

Mr. MAHN. In regard to the expansion and contraction of gasoline, is it not a fact that the wholesaler buys it at a certain standard temperature? Would it not be possible to do the same thing in the case of the tank wagon?

Mr. ESTES. Mr. Chairman, I would like to ask Mr. Holbrook if he thinks it is within the bounds of possibility and practicable to correct for contraction and expansion of the contents of vehicle tanks by reducing to a standard temperature. This is the method used in sales from the refineries to the wholesalers. Why should it stop with tank-car shipments? Why not continue it down through vehicle tank deliveries?

Mr. HOLBROOK. I would like to get the oil men's viewpoint. I have never made up my mind whether it is practical. It is admittedly difficult.

The ACTING CHAIRMAN. It is not at all without the bounds of possibility to do it, but we would still have to have the dome indicator.

Mr. SHOEMAKER. Mr. Chairman, in regard to the question just raised about the sale of gasoline on a standard temperature basis, I do not know of anything that would be more disturbing to the industry and more confusing to both the buyer and the seller, even not considering the item of expense to the seller and the tremendous amount of bookkeeping and invoicing. And really is there any practical need for it?

The next point in the specification is that requiring an expansion space of not less than 2 per cent of the nominal capacity of the compartment. I assume your committee has been guided by the present legislation on tank cars in arriving at a figure of 2 per cent for expansion in vehicle tanks.

Now, gentlemen, two years ago the Interstate Commerce Commission told Colonel Dunn, of the Bureau of Explosives, that they felt that tank cars should have more than 2 per cent expansion space on account of the unknown variations in temperature and the consequent changes in volume. The Bureau of Explosives in their 1923 issue of freight tariffs promulgated an outage table on tank cars, in which they recommended outages up to as high as 6 to 8 per cent, which sometimes required the shippers of tank cars to allow an outage in the shell of as much as 10 inches.

The oil committee of the American Petroleum Institute provided group committees throughout the country, and with the expenditure of about $15,000 the institute prepared a very comprehensive report that showed that even in carloads of gasoline the temperature increase was seldom, if ever, 20°, even when the trains were in transit two or three weeks. Representatives of the Bureau of Mines rode those trains and took thermometer readings. That was very conclusive evidence that even in tank-car shipments this contraction and expansion is not so serious as it seems.

At the hearings before the Interstate Commerce Commission Colonel Dunn and the commission agreed; and Commissioner Richardson ruled that it was not entirely necessary to have more than 2 per cent outage on any car, and this rule stands to-day. That means, gentlemen, that you can ship a carload or a trainload of

gasoline from a point like Whiting, Ind., to New Orleans, and you would not have to leave more than the dome outage. That report is a matter of record. Now, if the contraction and expansion is not such a vital thing, then, gentlemen, should we not go very slow when we talk about expansion space in vehicle tanks when the load is on the road only three or four hours and where the compartment is often emptied in 30 minutes? As one of the previous speakers brought out, we are laying too much stress on this increase and decrease in volume because we certainly can not compare a vehicle tank in any sense with a tank car. The Interstate Commerce Commission has agreed with the findings of the Bureau of Mines, and we should not attempt to apply anything like that to vehicle tanks. The experience of many years in the industry has proven that when tank wagons are loaded to the bottom thread in the dome it is entirely adequate. It is an exception rather than the rule that a certain amount is drawn off. Take to-day, a truck starts off and in four or five hours it comes back. There is nothing likely to happen in that time.

Mr. Holbrook. Are you advised as to what that report contains in the way of a formula or a method for determining an average temperature applicable to vehicle tanks? I know that the ascertaining of an average temperature of the whole volume of gasoline in a vehicle tank is attended with a good deal of difficulty.

Mr. Shoemaker. We had an inspector from the Bureau of Mines, at Bartlesville, with assistants, ride the cars for five or six days, and they took hourly temperature observations so that the expansion and contraction could be computed. The investigation was purely on tank cars.

Mr. Holbrook. I was asking for information as to whether that report to which you refer gave the method of arriving at average temperatures.

Mr. Shoemaker. The temperature was computed in this manner: The United States Weather Bureau was consulted as to the temperatures in the various parts of the country. For example, if you were going to make a shipment from some mid-continent field to the seaboard, the average temperature would be worked out, and since we knew the time and route of the shipment we were able to work out the practical and theoretical expansion and contraction. Another consideration is that we found by actual observation that when gasoline was loaded into a tank car and a certain number of inches were left out in the shell the greater surface of the liquid was actually conducive to greater evaporation. This has been verified by several independent oil companies who investigated it. In gas tanks and everything of that nature every one-tenth of 1 per cent loss which is avoidable is a mighty big thing.

Mr. Kanzer. I would like to make the point that you require indicators but do not require that they be uniformly placed.

Mr. Holbrook. The provision with respect to the placing of the indicator is that it shall be in the center of the longitudinal axis and it shall be so positioned that there is a certain expansion space above it.

Mr. Kanzer. I do not see why we can not have uniformity in this matter.

Mr. HOLBROOK. The positioning of the indicator must be considered in connection with the capacity of the domes. The dome capacity would have a great deal to do with it.

Mr. KANZER. I would like to have it uniform throughout the country.

Mr. HOLBROOK. If the indicator is definite, as I see it, uniformity would mean nothing, because the various tank wagons are constructed in different ways and it might be necessary to have the indicators in different positions. Each indicator must be so placed that accuracy is obtained. [Reading:]

3. The indicator shall be so positioned that when a compartment is filled to the indicator there will remain an expansion space of not less than 2 per cent of the nominal capacity of the compartment.

It seems that this has been discussed in connection with the previous specifications. [Reading:]

4. The filler opening of each compartment shall be so positioned as to allow an indicator in this opening to be located as provided in specification No. 2. The filler opening shall be of such a size as readily to permit of visual inspection of the bottom of the compartment.

Mr. WINCHESTER. What is the point? When full or empty?

Mr. HOLBROOK. To ascertain whether the compartment has been properly emptied. If the tank is on an angle, it may be a matter of doubt whether or not the tank will drain in that position. If the bottom of the compartment can be inspected, it can be determined as a matter of actual fact whether it has been drained. [Reading:]

5. Each compartment shall be provided with suitable venting means to prevent the formation of air pockets by permitting the escape of air from all parts of the compartment designed to be filled with liquid and to permit the influx of air to the compartment during the process of delivery.

Mr. WINCHESTER. At the present time it is the practice, I think, of all tank makers to put one vent in the center of the handhole cover, and it seems to me that it would be a good idea to draw regulations to make a provision for that one only. There is a possibility that in some localities the seller might want two or three in the top of the tank. It is very difficult to get those vents tight under some conditions. You sometimes see a truck going over a heavy bump and the gas coming up through the vent, providing it is not functioning properly. In case you are selling the tank full, you might run into difficulties which we do not have at the present time.

Mr. ESTES. We can not say that only one vent is necessary. It has been my experience that where you have the collar, such as Captain Austin extends down into the gasoline, there may be air pockets formed which may prevent proper calibration. The quantity of gas that can be put into a compartment will vary.

Mr. WINCHESTER. The point has been brought out by some of the others that tanks are more accurately loaded when the tank is setting level, which should be considered.

The ACTING CHAIRMAN. If the tank were to be filled when not level, the liquid would seal off at the edge of the manhole and leave a large pocket of air in the tank, which is normally supposed to be filled with gasoline if full measure is given.

Mr. Holbrook. The venting of the ends of the tank would not necessarily mean extra vents through the shell of the tank. These vents can communicate with the dome space, and then it seems that one outside vent could take care of everything.

(At this point Mr. McGrady, first vice president, resumed the chair.)

PRESENTATION OF RESOLUTIONS AND MEDALLION TO DR. SAMUEL WESLEY STRATTON, HONORARY PRESIDENT OF THE CONFERENCE

Mr. McGrady. Ladies and gentlemen, at this point I wish to call your attention to a number on our program to which no doubt you have been looking forward—"Presentation of resolutions and medallion to Dr. S. W. Stratton, honorary president of the conference." This medallion and the resolutions have been subscribed by the inspectors of weights and measures and representatives of manufacturers of weighing and measuring devices throughout the United States. I will call on Joseph J. Holwell, representing the weights and measures officials of the United States, to make the presentation.

REMARKS OF JOSEPH J. HOLWELL, REPRESENTING THE WEIGHTS AND MEASURES OFFICIALS

It is an honor and a privilege to have been selected as the spokesman of the weights and measures officials of the United States, meeting here in Washington in annual conference, to voice their appreciation and gratitude to Dr. Samuel Wesley Stratton for the splendid service which he performed while head of the national Bureau of Standards to advance the cause of weights and measures in this country.

I do not know of any group of public officials who have done more to promote a higher standard of ethics in the business life of America than have the weights and measures officials of this country. They have been the pioneers in our States, in our cities, in our towns, in our villages, and in the sparsely settled sections of this country for the square deal in all transactions between the buyer and seller. They have labored indefatigably in the cause of promoting the introduction and the use of honest and accurate weighing and measuring devices in all merchandising. They have fought the fight; they have been the vanguard; and in their fight for honest weights and measures they have contributed immeasurably toward the highest standard of citizenship in the United States. They have invariably been men of character, possessing courage, honesty, integrity, and a love for their work. Many of these pioneers have passed "home," Doctor Stratton, but the labor and the sacrifices which they made in life have not been in vain, for to-day there is a higher standard in the business and commercial life of the Nation, and, as I have said, these weights and measures officials have contributed their part in elevating the standards of business ethics.

Doctor Stratton, there is a joy which comes to one who has performed splendid services to mankind. We weights and measures officials realize that working individually we would have accomplished little, but fortunately for us we had you as a leader and

guide, and under your direction we have advanced far during the past quarter of a century. You brought to Washington each year the man from the East and the man from the West, the man from the North and the man from the South, to discuss together their problems and troubles, and you helped them work out a proper solution of their difficulties.

So, Doctor Stratton, when the Massachusetts Institute of Technology called you to its presidency in January of last year we were all gratified at this recognition of one who did so much to promote a higher standard in both science and industry; and in order to voice our joy we spread on the minutes of last year's conference resolutions embodying your life work and our appreciation of the service which you performed for us. We now have had these resolutions drawn up in a permanent form, so that you may always have at hand the evidence that you have loyal friends, both in the weights and measures officials of the United States and in the representatives of the manufacturers engaged in producing weighing and measuring devices. But, Doctor Stratton, we realize that no matter how fine the quality of materials used in the embodying of these resolutions, in the passage of time the paper will decay and the ink fade away; so in order that you might have a lasting memorial of these times, in order that those who may come after you may know of the work that you performed while head of the national Bureau of Standards, and of our deep appreciation of it, we have had a medallion struck off in solid gold which you may care to put by in a safe place, and we have also had a replica of this medallion struck off so that if you please you may have it near at hand, to remind you at all times that the weights and measures officials of the United States feel that they had in you a real guide.

I regret very much, Doctor Stratton, that we have not with us D. J. Moynihan, who was one of those associated with me last year in the preparation of these resolutions and who was selected to represent the manufacturers of weights and measures here to-day. He writes to me as follows, and asks that this be read:

MAY 23, 1924.

Mr. JOSEPH J. HOLWELL,
c/o Conference of Weights and Measures, Bureau of Standards,
Washington, D. C.

DEAR JOE: Why should the spirit of mortal be proud?

I was very proud of the fact that I was to join in the tribute to Doctor Stratton and to share with you the great privilege of addressing, in my humble way, the sincere feeling of appreciation which I feel for Doctor Stratton as a man and of his wonderful service to the important work of weights and measures, to the manufacturers, to the public, and to the broad field of education.

The gods have decreed otherwise. Illness on the part of two of our executive officers makes it necessary for me to remain at Dayton at this time. I wish for you and all in attendance a most pleasant, helpful, and fruitful convention. I ask that you kindly convey to Doctor Stratton for me my most profound respect and all good wishes for his continued good health, happiness, and prosperity.

With kindest personal regards, believe me,
Sincerely yours,

(Signed) D. J. MOYNIHAN,
Vice President.

I wish to express in my own name, and I feel that all those who are gathered here this morning also wish me to express to you in their

names, the hope, Doctor Stratton, that you may enjoy splendid health for many years to come, and that you may carry with you into your new field of endeavor the love, loyalty, and esteem manifested by my associates gathered in this auditorium this morning.

(Mr. Holwell presented the medallion and resolutions to Doctor Stratton.)

(The audience rose to show its respect and esteem for Doctor Stratton.)

REMARKS OF DR. S. W. STRATTON, HONORARY PRESIDENT OF THE CONFERENCE

Gentlemen: It is always difficult, and generally impossible, to say the right thing on an occasion of this kind.

I have worked with many committees, here and elsewhere, and have been interested in a great many movements. I think in none have I been more interested or worked harder than in this one.

It has been a great pleasure to work with you. Many of you, coming from the serious and practical walks of life, have raised questions that were difficult to solve, but in every case you have come around to the common-sense, practical solution of the question. I do not forget, in accepting this testimonial, that I owe a great deal to my associates in the bureau for the success of this work; and that in this splendid presentation and gift you are not only honoring me but you are also honoring the memory of Mr. Fischer, who has gone from among us, and the associates of the weights and measures division. I have always had loyal support. I have been keenly interested in their work, and I feel it is in many ways the most important branch of the bureau's work, especially so in connection with the public interest.

I appreciate well what your spokesman has said in regard to your position with the public. No class of men comes more closely into contact with the dealings of men one with another; no class of men can do more to promote good understanding than you; and this is one of the reasons that I have so enjoyed working with you.

I thank you from the bottom of my heart for this testimonial and the resolutions which accompany it.

I shall meet with you from time to time and will endeavor to be with you as long as it is possible. If you are coming our way at any time, I shall be glad to see you, and as I go throughout the country I shall take every opportunity to see you. I thank you.

(Thereupon, at 12.30 o'clock p. m., the conference took a recess until 2 o'clock p. m.)

SIXTH SESSION (AFTERNOON OF WEDNESDAY, MAY 28, 1924)

The conference reassembled at 2.15 o'clock p. m., William B. McGrady, first vice president, in the chair.

The ACTING CHAIRMAN. The first number on the program will be an address by Mr. William Smedley, secretary of the Retail Merchants' Association of Pennsylvania, who will speak on the subject "The retail merchant." I am glad to tell you that Mr. Smedley made an address before the Pennsylvania State Weights and Measures Association two years ago, and it was very pleasing, and I know if you give your attention you will be pleased with his remarks.

THE RETAIL MERCHANT

By WILLIAM SMEDLEY, *Secretary, Retail Merchants' Association of Pennsylvania*

Mr. Chairman and ladies and gentleman: I am very glad to be here, although I am wondering why I am here. I am not the sealer of weights and measures, but the other fellow. I represent the retail merchants. I had the pleasure of appearing before the Pennsylvania officials some time ago, and Mr. McGrady got me into it, and now he has me in this. I feel a good deal like a fellow who stopped a pedestrian in New York and wanted to know if he could direct him to the Pennsylvania Hotel. The man was a great stutterer, and it took a long time for him to get it out, and finally he said, "Out of all the men in New York, why did you pick on me?" I am sort of worried about this job of mine to-day, but I have learned one thing in life, and that is that the things I worry about do not happen and the things that I do not worry about do happen.

I am very much interested in your work, because I represent a class of men who come officially in contact with you. My position is secretary of the Retail Merchants' Association of Pennsylvania, and we are very much interested in the enforcing of the law. I want to say that the 10,000 men we have under our banners are law-abiding citizens and want to do business on the square. We consider that honesty in weights and measures is a matter that is very important, and anything that helps honest weights and measures always secures our commendation. Our friend, Mr. McGrady, knows he has no better supporters in the State than our organization.

You know, people have a way of going to the intelligent merchant for their merchandise, and I am not one of those fellows who believes price is everything in the world. I believe in service. It is our opportunity. We do not estimate the value of service at half enough. If I were to cut an apple, you could not tell me how many apples are represented by one of the seeds. But I plant that seed and it germinates, grows, blossoms, and bears fruit, and that is the reward of service. I believe you gentlemen all over the country have a wonderful opportunity to render service—I will

not say you have a responsibility, because it is not my job to tell you that. When we have an opportunity to render service, then it seems to me we have a wonderful asset in the prosecution of our work.

Now, I do not believe in the fear of the law. You men naturally are looked upon with some awe by some people. I think every merchant should look upon you as his friends. They say the fear of the law is the best policeman. That may be true, but I think the best thing to do is to obey the law and know you are right because it is right; and that course is always in the interest of good business. Business honesty is one of the fundamental principles of organization. I am afraid you gentlemen may think I intend making an organization talk and organizing you into a grocerymen's association, but I have no such plan. You know they say the reason marriage has so many casualties is because so many ignorant people go into it. I think it is a good deal the same with our retail grocers.

Again, I do not believe a man should obey the law only because he thinks it is right to do so; he ought to obey it because observance of the law is a great big asset to him in his business. And he is bound to see this, gentlemen, with you as his partners. Do the people believe in better standards of honesty? I believe 90 per cent of the merchants of this country believe in the square deal, and I want all of them to be square in their dealing. I tell the merchants that the dishonest man has no place in business; there is only one place for him, and that is in jail; and if violators were put in jail rather than fined there would soon be very few dishonest merchants.

I was in Europe some time ago, in a little country town, and I was very much amazed at the procession of men going into the police station. They all seemed to have bundles, and I inquired what they were doing. I was told that once a year all the merchants had to bring their yard sticks and scales to the police station to have them sealed, and if they had tampered with them they were put in jail. I wonder what would happen if we told all of the Pennsylvania merchants to go to Mr. McGrady's office at one time. I think I could get a job to help him.

I was in the grocery business in Philadelphia years ago; all kinds of tricks were resorted to in those days. I have seen them take staves out of a half-peck measure and join it up again, and practice other tricks to give short weight and short measure—you know what they are. We did not have weights and measures inspection then that meant anything. Once in a while an officer would come around with a wagon and we were told to fix up the scales, but in a short while we would be going on with the same old tricks. That is all changed now, and you gentlemen are responsible, and what you have accomplished is in the interest of the public. Do not understand that I myself was doing this sort of thing. I am telling you what the other fellow did. To cheat then was thought to be smart, I suppose, but a man who willfully uses a false scale should be punished. The honest retail merchant is handicapped by the man who cheats, and the honorable retailer pays a heavy toll. If we could add together all the amounts that we pay out annually as a result of dishonesty and ignorance in merchandizing, we would have enough to pay a substantial part of the national debt.

The reputable merchant stands for absolute honesty in weight and in advertising statements. There is just as much dishonesty in an advertising statement which is untrue as there is in short weight or measure. We are trying to put truth in advertising, because that is as important as truth in regard to measure. We are trying to be honest in price. You haven't anything to do with that, but we have a great deal to do with it, and we are trying to teach people to be honest in their prices and in their method of conducting business. I believe that the average retail merchant stands foursquare, and he looks on you not only as an enforcer of law but as his great friend; and it is along that line that I want to talk to you about the friendly relations that you have with the retailer.

You know, getting back to this question of quality, we are all prone to look at the dark side of things. I make a good many talks, and sometimes I like to do things to attract attention. On one occasion in a small town I held up before my audience a piece of white paper with an ink blot on it. I asked the gentlemen assembled what they saw. They said "a black spot." I said "What is around it?" "White." That is the story. There is a little darkness everywhere, but there is a whole lot of good around it. There is good in your business and good in mine.

A little boy in his chamber saw the light reflected from the windows of a neighbor's house and he called it "the house of the golden windows." His mother promised him she would take him over there some time. When she did, behold! the sun had shifted and the golden windows were in his own house. And so it is in life. We are so apt to think the golden windows are in one place alone when they are all about us. It all depends upon the point of view.

The retail merchant has many problems; he will tell you he has a thousand. But the biggest problem the merchant has is to make money and make it honestly. The man who does not make much money in this world is not of very much use to his community; this is for the reason that to succeed our neighbors also must succeed, as every loss or gain is shared by all alike, and therefore we should help to make money. You have stores that are selling goods below what they are paying for them; they might profit somebody, but they will be a loss to the community, and the man who suffers most is the intelligent, hard-working merchant who is trying to make a living honestly.

I tell the merchants they must keep down their overhead; that if the overhead increases they will soon meet the law of diminishing returns and then the more they do the less they will get. I recently bought a ham sandwich—you know the kind—and I said "George, do you slice your ham with a Gillette razor blade?" and George said. "No; we photograph the slice of ham and reproduce it on the bread."

You are not particularly interested in the problems of the retailer; you have your own problems to solve. But the cooperation between you and the merchant is important. You have no responsibility, but you have a rare opportunity to help the merchant if the men representing your organization throughout the country have the right viewpoint. You have a wonderful opportunity, because they are looking up to you, and it is so easy when a man likes you to give him advice. We are here for cooperation—the exchange of ideas

and cooperation. If I give you a dollar and you give me a dollar, neither will have more than a dollar as a result of the swap; but if I have an idea and you have an idea and we swap, then each of us will have two ideas. So it is if you will cooperate and work together.

The basis of your cooperation is your friendliness, and then you also have tactfulness. If we all could be tactful! Tact is a wonderful thing. Tact is the art of living with men, and it is your job and mine to live with men. We can all be helpful in this world.

Just passing through this wonderful springtime, I think of the legend wherein Spring is pictured as a fair maiden. They say she comes to the earth—brown, bare—and as she passes it is covered with green; she stretches out her hands and touches the valleys and they blossom and bear fruit; she ascends the hills and they blossom; and then she passes to the heights, and wherever she goes flowers bloom. All the way from earth to heaven she blesses. And if I can convey just a little message to-day out of the philosophy of my life it is that you embrace that wonderful opportunity which we men in public business have of being just a little more helpful to those around us.

If I were to offer a suggestion, it would be that the merchants and everybody should sell by weight. I believe in selling by weight. I do not know whether I am running with you on this, but when we buy and sell by weight then we will change things around and reduce the high cost of living. We are paying a big premium by not selling by weight.

Consider the merchants you are dealing with and cooperating with. It is easier to lead them than force them. A pat on the head is better than a kick. All the merchant wants is a square deal, a fair start, and a clear field.

If I were to make another suggestion as to your helpfulness as you get around among the people, it would be to teach men to use their talents. The one trouble with most men is that they do not use their heads. You know the date of our death is when we cease to originate, or create some new ideas, or to go ahead. We need brains in my business, and you need them in your business.

Now, gentlemen, I am only going to talk another minute. I have enjoyed being with you and am greatly interested in what you do. You know I believe these organizations of ours are worth all they cost. It costs something to bring you all here for this wonderful exchange of ideas, but it certainly is worth it.

My final thought and message to you gentlemen is friendliness and helpfulness; and if we have an opportunity let us spread out our arms and help, and then you will make your departments a tremendously greater force for the things you stand for. I thank you.

The Acting Chairman. You have all heard our good friend, Mr. Smedley, and I think you are all of the same opinion that we were over in Pennsylvania a couple of years ago—that he has given us timely advice which, if followed, will make life more rosy. I would like to say to Mr. Smedley that his idea in regard to "treading on dangerous ground" regarding selling by weight is wrong, as the consensus of opinion of the sealers of weights and measures is that everything should be sold by weight.

CONSIDERATION OF TENTATIVE SPECIFICATIONS AND TOLERANCES FOR VEHICLE TANKS—Continued

The Acting Chairman. We will now resume our consideration of tentative specifications and tolerances for vehicle tanks.

Mr. Holbrook. We have reached specification No. 6 [reading]:

6. Each tank, and all delivery piping attached thereto and used in connection therewith, shall be so designed and constructed and shall be so mounted that, when the vehicle upon which they are mounted is standing in any position upon a surface making an angle of 5 per cent (approximately 3°) with the horizontal, complete delivery may be made from any compartment through the delivery faucets or valves, whether other compartments are full or empty. If a compartment has more than one discharge outlet, connections from each outlet shall be made to a single line of piping in all cases where either line of piping would otherwise be more than 24 inches long. If two delivery faucets or valves are provided for one compartment, the line of piping shall be branched at such a point that the length of line from either faucet to the point where the line is branched shall not exceed 24 inches.

The Acting Chairman. Is there any discussion of specification No. 6? [After a pause.] If not we will proceed with the next specification.

Mr. Holbrook (reading):

7. When emergency valves, designed to close the discharge outlets from compartments, are provided, the capacities of such compartments shall be construed as excluding the capacity of the piping leading therefrom. Such emergency valves shall be so controlled that they may be independently opened; however, the construction may be such that all these emergency valves which may be open at any time may be closed simultaneously, either by automatic or manual means.

Mr. Winchester. Mr. Chairman, I rather feel that the specification calling for the exclusion of the capacity of the pipes is misleading, inasmuch as it is practically impossible to construct the tank so that you can measure its capacity without including the capacity of the pipes. The capacity of the pipes should be included in the capacity of the tank.

Mr. Holbrook (reading):

8. Each compartment shall be plainly and conspicuously marked on at least one side thereof with its capacity to the nearest half-gallon, as follows: "Capacity, —— gallons to bottom of indicator," and also with the date of the most recent calibration. In addition, each compartment of a tank having two or more compartments shall be plainly and conspicuously marked with a designating mark, such designating mark to be different for each compartment of a particular tank. All delivery faucets or valves on such tanks shall be plainly and conspicuously marked with designating characters corresponding to those of the compartments with which they are connected.

Mr. Winchester. In connection with the marking of the capacity in gallons, every tank wagon, practically, used throughout the country has a certain advertising value, and in putting on the number of words indicated in this specification it will occupy a certain space which can be used by the vendors at the present time for advertising purposes. In addition to that, it would seem to me that merely to state the number of gallons at some point on the tank would be just as satisfactory as all the wording you have here. There is one other point in connection with that, Mr. Chairman, that I would like to bring up, that in many cases tanks will have to be recalibrated from time to time, and it would necessitate changing the wording.

My personal opinion is that a plate that could be readily changed answers the purpose better than painting the number on each compartment as indicated by these specifications.

Mr. HOLBROOK (reading):

9. All markings, figures, and graduations required under these specifications shall be of such size, design, material, and location and shall be sc applied or affixed that they will not tend easily to become obliterated or illegible.

The ACTING CHAIRMAN. Are there any remarks on the specification?

Mr. HOLBROOK (reading):

10. All tanks and all devices designed to be attached thereto and used in connection therewith shall be of such construction that they are not designed to and may not be used to facilitate the perpetration of fraud.

That is a general specification that is always added to cover special cases not otherwise provided for. [Reading:]

TOLERANCES.—The tolerance to be allowed in excess or deficiency on all vehicle tank compartments which are being tested by the weights and measures official for the first time to verify the accuracy of a capacity marked thereon by a manufacturer or user shall be the values shown in the column headed "On first test" in the following table. The tolerance to be allowed in excess or deficiency on all subsequent tests made by the official to verify the accuracy of a marked capacity shall be the values shown in the column headed "On subsequent test." These tolerances are to be applied to the difference between the actual result of the calibration and the marked capacity of the compartment. Whenever the result of a calibration indicates that the marked capacity of a compartment is not correct within the tolerance to be applied and the capacity of the compartment is adjustable, then the result of the calibration shall be taken as the basis of an adjustment, and the adjustment shall be so made that the capacity of the compartment agrees as nearly as may be with such marked capacity. When the capacity of the compartment can not be adjusted to agree with the marked capacity, then the compartment shall be remarked in accordance with the provisions of specification No. 8.

Tolerances

Capacity of compartment		Tolerance	
From—	Up to and including—	On first test	On subsequent test
Gallons	*Gallons*	*Gallons*	*Gallons*
----------	175	½	½
175	325	½	1
325	475	¾	1½
475	575	1	2
575	725	1¼	2½
725	875	1½	3
875	975	1¾	3½
975	1,125	2	4
1,125	1,325	2½	5
1,325	1,500	3	6

Mr. PRIOR. What is the tolerance on a 1,500-gallon tank?

The ACTING CHAIRMAN. Three gallons on first inspection; 6 gallons on a subsequent test.

Mr. MARONEY. Mr. Chairman, these specifications and tolerances for vehicle tanks are subject to revision and will be reported back to this conference by this committee. May I suggest to the committee that they go into the proposition of equipping all tanks carry-

ing oils of any kind with meters? I am of the firm conviction that the meters can be put on at a reasonable expenditure. If that be done, there is no need for calibration or for consideration of expansion and contraction, etc. It would be more satisfactory to the seller and still more so to the purchaser. As I understand it, practically all of the large companies who deal in these oils meter the oil from their receiving stations into their tank wagons, and they would never do it unless it was efficient. Therefore, if that is so, why can they not carry the plan further and put meters on the wagons and eliminate all these difficulties? I suggest that the committee which is now working on that matter take this up and see if it is not possible, feasible, and practical to put meters on these tanks.

Mr. Holbrook. The committee on tolerances and specifications during a large portion of the past week has been giving consideration to the specifications and tolerances which have been adopted by the conference from time to time in the past, and in this connection it has to report that some specifications have been found which it is considered might reasonably be amended at the present conference. This report is now ready for distribution in mimeographed form.

The Bureau of Standards, also, would be very pleased to have these considered at this time, inasmuch as it may be found possible during the coming year to republish our Handbook No. 1, Manual of Inspection and Information for Weights and Measures Officials, in which case it would be very advisable to have the specifications in such shape that they will not soon have to be amended again. The committee will be glad to have you take copies of these and familiarize yourselves with the contents thereof, so that when the report is called up to-morrow morning we may be ready to go ahead with it. I will leave these copies on the desk, so that you may procure them now or as you go out.

METHOD OF TEST OF TAXIMETERS IN CHICAGO

By William F. Cluett, *Chief Deputy Inspector of Weights and Measures, City of Chicago, Ill.*

A taximeter is defined as a mechanical instrument or device by which the charge for hire of a public cab is mechanically calculated, either for distance traveled or for waiting time, or for both, and upon which such charge is indicated by means of figures.

In 1910 the Chicago city council passed an ordinance regulating the rates of fare and providing for the inspection, testing, and sealing of taximeters, which were placed under the jurisdiction of the department of weights and measures. A mechanical expert was employed as a taximeter inspector, and he devised a machine for the purpose of testing the accuracy of the taximeters used in the city. This machine consists of a horizontal shaft driven by an electric motor. At intervals along this shaft there are several vertical shafts driven through bevel gears. These latter shafts extend up through horizontal metal plates or meter brackets and are so designed as to connect with and revolve the shaft of a meter placed in proper position on the meter bracket. A cyclometer, or revolution counter, is mounted on the end of the horizontal shaft.

Taximeters are so constructed that the face of the meter automatically registers the distance traveled or the time consumed, in money charges, while the charge for extra passengers is turned up by hand on the face of the meter by the operator. The back of the meter shows the total mileage, live mileage, the number of flag pulls or trips, the number of extras, and the money units. The different makes of taximeters are so constructed that a known number of revolutions of the vertical shaft connected with the mechanism of the meter is made per mile.

The test of a taximeter in Chicago consists of two parts: (*a*) A bench or laboratory test, and (*b*) a road test. The bench test is carried on only on new meters which are to be installed on cabs; thereafter during the life of the meter the road test is depended upon to show the accuracy and condition of the meter. In 1910 we inspected 203 meters. In 1923 this number had grown to 3,500. Tests on each meter are required twice each year.

The bench or laboratory test is conducted as follows: A reading is taken of the totals on the back of the meter, the meter is cleared and placed on one of the meter brackets mentioned above, with its drive shaft in engagement with the upright shaft extending up through the plate. The flag is then thrown into operating position and simultaneously the motor is started, causing the meter shaft to revolve. The number of revolutions which should cause the various money drops is known, and the action of the money drops is compared with the revolutions being made by the shaft to determine that these are operating correctly. In this test the meter is driven at two high speeds of the order of a cab speed of 60 and 120 miles per hour, respectively.

On the first money drop an excess tolerance of two revolutions of the drive shaft is allowed; no tolerance in deficiency is permitted on the bench test. The money drops, after the first one, must drop on the proper revolution; there must be no consistent gain or loss, otherwise the meter is condemned for readjustment. The reason for the tolerance being allowed only on the first money drop is because all lost motion incident to the proper engagement of the gear train is taken up after one or two revolutions are made, and thereafter all gears are properly in mesh.

To illustrate what this tolerance may mean in terms of feet traveled, when the taximeter is attached to a cab, we may take as an example a meter which makes 80 revolutions of the vertical shaft to the mile. In this case two revolutions is two-eightieths mile, or 132 feet. On other meters making 60 revolutions per mile, for instance, two revolutions would amount to two-sixtieths mile, or 176 feet.

In the case of the meter mentioned first in the above illustration these are always tested on a direct drive to the main shaft. This is the manner in which the meter is connected on a cab equipped with 32-inch tires, in this case no auxiliary gearing being employed. When such a meter is connected with a cab having tires of another diameter than 32 inches, suitable gearing is installed on the bracket holding the meter and the meter is driven through this. The test is made similarly in the case of other meters having outside gear boxes.

In the case of meters having all gears inside the case, when these are submitted for test the meter is either labeled or tagged showing for what tire size the particular gearing employed is intended. From tables the proper number of revolutions corresponding to the various money drops is found, and the meters tested accordingly.

The meters tested are run usually until $5 is shown, the corresponding mileage computed, and the mileage figures on the back of the meter checked for accuracy as well as the money drops; also it is noted that the "extras" operate properly.

The second part of the bench test consists in checking the accuracy of the clock movement in the meter. The clock is wound up, the flag is thrown, and the clock allowed to run one hour. Waiting time under the city ordinance is charged at the rate of $1.50 per hour. It is noted that the various drops operate properly at this rate. A plus or minus tolerance of two minutes per hour is allowed. If the above tests have been properly met, it is considered that the meter head is correct, and it is ready to be installed on the cab, with proper auxiliary gearing if the meter as tested was adjusted for a tire diameter differing from the tire diameter of the cab on which it is placed. To determine the gearing or gear ratio, we stand the car on a level floor, measure from the floor to the center of the hub, then multiply by two to get the running diameter of the tire. A fabric tire nominally 32 inches in diameter will vary according to the make of the tire from 30½ to 31¾ inches running diameter with 70 pounds air pressure in the casing.

Some meters are designed on a basis of 640 revolutions of a 32-inch tire to a mile. There are actually 630.25 revolutions per mile of a tire exactly 32 inches in diameter. Therefore, these meters would be 9¾ revolutions, or 132 feet, per mile in favor of the passenger when attached to a cab equipped with tires of an effective diameter of exactly 32 inches. This discrepancy is probably a maximum one, and in the case of these meters when geared for use with other sized tires this discrepancy may be considerably reduced. Other meters also have discrepancies of this same general character.

The road test is used extensively in Chicago and is believed to be essential in obtaining accuracy of meter registration. This test is the only one given to taximeters, after the first bench test at the time of original installation, except in the case of equipment used by one company operating a very large number of cabs, in which case the meters are given a bench test each six months, and road tests on meters attached to these cabs are rare. This is due to the fact that lack of force and the number of these cabs (2,500) renders road tests impracticable. Road tests are considered less necessary in case of these cabs on account of standardized construction of cabs and meters.

In general, we consider the road tests, especially on some old pattern meters in which some of the parts are lightly and poorly constructed, preferable to a wheel test as made in some other cities, because the jars and shocks incident to actual operation will sometimes reveal defects, such as loose money drops which may drop too soon and too often, which would not be brought out by such a wheel test. In the case of another make of meter a road test is very important, since this will reveal whether or not the instrument is being affected by a bind on the cable. The money drops in this instrument are

very sensitive and may be affected by such a bind. Road tests also reveal many cases of meters registering improperly due to faulty installation on the cab.

The road test is conducted as follows: The cab starts toward a measured course, and as it passes the starting line the flag is thrown into the operating position. The inspector then watches the money drops and makes sure that they drop properly over the mile straightaway. The cab then turns around and comes back, the meter continuing to operate and the inspector continuing to check. If the result of the test is inconclusive, the test is performed again. The inspector estimates the observed errors in terms of feet.

The tolerance on the road test is 150 feet slow or fast on the first money drop, whether this represents one-third or one-half mile. No added tolerance is allowed on the second or any subsequent money drop. Regardless of length of test, the total allowance is 150 feet.

On the bench test meters are sealed with a paper label, which states that the taximeter has been inspected and approved by the inspector of weights and measures, giving date of test. A coat of shellac is brushed over the label to render it impervious to moisture. After the meter has been attached to the cab and given a road test a lead and wire seal is attached to the meter head, another lead and wire seal is attached at the connection between the cable and the meter head at the bracket, and a similar lead seal is attached to the star gear at the front wheel. This prevents substitution of new gears.

When we first started to inspect taximeters, 43 per cent of those found in use registered inaccurately. Now no meter is permitted to be used until after it has been inspected and approved, and it must be reinspected once each six months thereafter. Of course, we still occasionally find a meter that registers inaccurately, due to its having gotten out of order, but we do not find meters in use that have been deliberately tampered with. We receive comparatively few complaints of incorrect taximeters in Chicago to-day, and a majority of these complaints are due to the fact that we have five different rates of fare in the city, the city rate being the highest of all.

The prevailing rates are as follows:

"60–40" (40 cents for first one-half mile or fraction thereof for one person; 10 cents for each one-quarter mile, or fraction thereof, thereafter; for each additional person for the whole journey, 25 cents). This is the maximum rate permitted under the city ordinance.

"50–40" (30 cents for first one-half mile or fraction thereof for one person; 10 cents for each one-quarter mile, or fraction thereof, thereafter; for each additional person for the whole journey, 25 cents).

"45–40" (25 cents for first one-half mile or fraction thereof for one person; 10 cents for each one-quarter mile, or fraction thereof, thereafter; for each additional person for the whole journey, 25 cents).

"50–30" (30 cents for first one-third mile or fraction thereof for one person; 10 cents for each one-third mile, or fraction thereof, thereafter; for each additional person for the whole journey, 25 cents).

"35–20" (25 cents for first one-half mile or fraction thereof for one person; 10 cents for each one-half mile, or fraction thereof, thereafter; for each additional person for the whole journey, 20 cents).

This last rate is used by five large cab companies and by about 12 smaller companies running three or four cars each, comprising in all 75 per cent of all cabs in Chicago. The higher rates are used by ap-

proximately 500 cabs in the city. A number of these at one time had their meters changed to a lesser rate, but because their trade did not increase on this account they changed back to their original rates. They figure they will only get the passenger once and they might as well get as much as they can from him.

Even when the meter situation is well taken care of and correct registration of charges is the general rule, you must expect that difficulties will still be encountered, complaints will be received, and investigations and explanations will be necessary. Cases such as the following often cause trouble: A person may take a cab several times from the same starting point to the same destination and for the first few trips may get a cab with a "35–20" meter. For illustration, we will say the trip is five miles and the charge is $1.15. If the next time he makes this trip he gets a cab with a "60–40" meter, the charge will be $2.20. The passenger not wishing to have an argument will probably pay the fare registered, but he is very likely to report that cab number so and so has a "crooked" meter. This cab is looked up and found to have a "60–40" meter, and explanations are made. Or even if the passenger takes a cab having a meter with the rate to which he is accustomed, while going from the same starting point to the same destination a different route may be taken which may cause a difference in the mileage, or there may be more turning in and out dodging vehicles on one trip than another with the same result, all of which cause a difference in the charge registered. Traffic delays may also cause a difference in the charge; waiting time is charged for at the rate of $1.50 per hour, and as soon as the flag is thrown the clock in the meter starts running. This clock movement and the taximeter shaft which is operated from the front wheel of the cab are connected in such a manner that if the cab stops, or if it runs very slowly, the clock takes up the movement and registers at the rate of 10 cents for each four minutes, thereby increasing the charge recorded. It is apparent, then, that there are reasons other than crooked or faulty meters which may account for differences in charges made for what is presumably the same distance traveled.

NOTES ON THE TESTING OF TAXIMETERS IN NEW YORK, N. Y.

Mr. CLUETT. I have here a synopsis of the work of taximeter inspection in New York City, prepared by John Drennen, chief of the division of licensed vehicles of the department of licenses, in the form of a letter to J. J. Holwell. Mr. Holwell is unable to be present at this time and has asked me to read this letter to the conference. It is as follows:

CITY OF NEW YORK, DEPARTMENT OF LICENSES,
DIVISION OF LICENSED VEHICLES,
OFFICE OF THE DEPUTY COMMISSIONER,
517–519 West Fifty-seventh Street, New York, May 22, 1924.

HON. JOSEPH J. HOLWELL,
Mayor's Bureau of Weights and Measures, Municipal Building, City.

MY DEAR COMMISSIONER: I am inclosing herewith a copy of the public hack ordinance governing the operation of taxicabs in the city of New York, and on pages 42 and 43 may be found the sections that govern the regulation of

taximeters. The following rates of fare prevail in the city of New York at the present time:

For 1 or 2 passengers (single tariff):
For the first one-half mile or any part thereof ..... 30 cents.
For each succeeding one-fourth mile or any part thereof ..... 10 cents.
For three or more passengers (double tariff):
For the first one-half mile or any part thereof ..... 40 cents.
For each succeeding one-sixth mile or any part thereof ..... 10 cents.

Taxicabs having meters affixed thereto recording both the above rates of fare have taximeters thereon painted "red" and the flags thereof enameled "red."

For the first one-half mile or any part thereof ..... 30 cents.
For each succeeding one-fourth mile or any part thereof ..... 10 cents.
(For any number of passengers carried.)

Taxicabs having meters thereon recording the above rate of fare are equipped with taximeters painted "black" and the flags thereof enameled "white."

For the first one-half mile or any part thereof ..... 20 cents.
For each succeeding one-fourth mile or any part thereof ..... 10 cents.
(For any number of passengers carried.)

Taxicabs having meters affixed thereto recording the above rates of fare are equipped with taximeters painted "blue" and the flags thereof enameled "blue."

For the first one-third mile or any part thereof ..... 20 cents.
For each succeeding one-third mile or any part thereof ..... 10 cents.
(For any number of passengers carried.)

Taxicabs equipped with meters recording the above rate of fare have taximeters thereon painted "green" and the flags thereof enameled "green."

There are also a few taxicabs operating in the city of New York recording the following rate of fare:

For the first one-fourth mile or any part thereof ..... 15 cents.
For each succeeding one-fourth mile or any part thereof ..... 5 cents.

Taxicabs having meters thereon recording the above rate of fare are equipped with taximeters painted "green" and the flags thereof enameled "green." (The above rate governs any number of passengers carried.)

Taximeters are presented to our laboratory by the taximeter companies and individual owners, and these meters remain there for a period of 48 hours. A time test is given for the 6-hour period, and meters that contain both the single and double tariffs are tried out on a 50-mile test on each tariff; meters that contain only one tariff are tried out for a 50-mile test. (The speed is equal to about 80 miles an hour.) The laboratory is equipped with a testing table the shafts of which are driven by motor, and revolution counters are attached to each stand recording the number of revolutions to a mile.

The meter is placed on the testing table, and after the first 5, 10, or 15-mile test the number of revolutions and the amount of money shown on the face of the meter are checked up, and unless these two items check up correctly the meter is condemned for being either fast or slow. After the time and mileage tests, the meters are handled for manipulation; this is to see whether or not an amount greater than the rate of fare for which the meter is passed can be shown on the face of the meter. If the meter is approved, seals are affixed to the case thereof, pressed with a department seal; also a blue label is affixed to the face of the meter, stating the size of tire for which the meter is calibrated, date of examination, and inspector's name. If the meter is condemned, a red label is affixed to the face of the meter stating the defects.

All rate changes are made inside of the taximeter, and no changes are allowed to be made in the gear box. Changes in the gear box are permitted only for the different size tires.

Meters are then returned to the taximeter companies or individual owners and are then affixed to taxicabs. After meters are affixed to cabs the taxicabs, with the meters attached thereto, are presented for a final test and checking up to ascertain whether the cable is working properly; also whether the meter is affixed to a cab having the correct size tire for which said meter is calibrated.

The taxicab wheel to which the meter cable is affixed is jacked up and the wheel is coupled to a machine that has a revolution counter affixed and a test made for from 2 to 5 miles. (The speed of this machine is about 25

miles an hour.) If the test proves satisfactory, the cable attachments are sealed. All cables are connected to wheels by a star and band, and only this form of connection is accepted.

The following table, used in our final test, shows the size of the tire and the number of revolutions to a mile:

Tire	Revolutions per mile	Tire	Revolutions per mile
30-inch	680	34-inch	600
31-inch	660	35-inch	580
32-inch	640	36-inch	560
33-inch	620	37-inch	540

Trusting that this information will be satisfactory to you, I remain
Very truly yours,

(Signed) JOHN DRENNEN,
Chief, Division of Licensed Vehicles.

DISCUSSION ON TESTING OF TAXIMETERS

Mr. MARONEY. I do not believe I want to take up the time of the conference by discussing the method we use in testing taximeters in New Haven, because the gentlemen from Chicago and New York have covered the matter thoroughly. We use practically the same methods with one exception—we do not allow the use of duplex meters, on account of the fact that they can be manipulated by those who use them against the passenger who does not understand their operation.

The ACTING CHAIRMAN. Gentlemen, if there are any representatives of manufacturers of taximeters or of taxicab companies here we would like to hear from them.

Mr. J. W. WEIBLEY (representing the Pittsburgh Taximeter Co., Pittsburgh, Pa.). Looking at your amusing cartoons on the screen I am reminded that in the taximeter business we know that the disputes between the driver and the fare are classic, and they have been going on for a long time. The taximeter has done even more to develop the cab business than the improvement in the construction of the cabs, although the latter has done a great deal. The taximeter makes it possible for you to hail a cab on any street of the United States and be assured of a reasonable charge. In most of the larger cities taximeters are tested by the bureau of weights and measures, and that has made it possible for the cab companies to turn their cabs loose on the streets and feel assured of proper returns.

I think I can speak for the other manufacturers and say that we have built a meter that is just as nearly correct as we know how to construct it—not only correct on registration but correct from the standpoint of manipulation—so that it is almost impossible for the driver to put it out of order and cause it to register fast. And today, even if you had no inspection, as in the case of some of our large cities, the city of Pittsburgh, for instance, I think I can make the assertion that the taximeters are just as nearly correct as any place where you have an inspection, because the business is in the hands of reputable companies who see to it that those meters are properly maintained. The success of their business depends upon the meters

being correct. If they were not accurate, they would hear from their passengers. The only people who would be interested in fast meters are those men who own and operate the cabs themselves, and when the business is largely in the hands of these men an inspection of taximeters is necessary. A great many of you men, no doubt, are interested in learning how you shall test taximeters in your towns where you probably have a limited amount of assistance and probably no appropriation for machinery such as has been described by Mr. Cluett, or such as they have in New York. You are doubtless also interested in what variations or tolerances are to be allowed. We taximeter manufacturers are very much interested in that also. We would like to be with you in this conference when you agree on a uniform tolerance or on a uniform taximeter test recommended for those places where there is no machinery at present for doing this work.

The methods used in the testing of taximeters in Chicago and New York City are absolutely fair. In those cities they have had experience and know the problem, but you men who have not had the experience may not stop to consider what is necessary. For instance, the balloon tire, run on low pressure, which has now come into use, will cause greater variation on a course; then there are fabric and cord tires supposedly of the same size but actually of different sizes. If you test your cab over a measured course, you must allow a reasonable tolerance for these variations. In some cities in the United States to-day we have inspectors who allow no tolerances whatever. The manufacturers would like to see a uniform tolerance—a tolerance set up by the United States Bureau of Standards that we could all work to.

In so far as waiting time goes, the clock in a taximeter must be made very strong to withstand vibration and to withstand manipulation. Consequently, we can not get the same accuracy with that clock as with a fine chronometer or a fine clock on the wall, and we therefore need a reasonable allowance for variations.

I hope that you gentlemen will take this matter up and form a committee to work with us to establish a uniform tolerance for the testing of taximeters. It will be a great help to us, and it will be of benefit to those of you who do not as yet know the proper procedure.

The Acting Chairman. I can tell the gentleman that when I was an inspector for the city of Pittsburgh during 1910–1913 we laid out a course, anticipating the taking up of this question, but the public-service commission said, "Hands off," stating that the matter came under the jurisdiction of the State public-service commission.

Mr. Brown (representing the Ohmer Fare Register Co., of Dayton, Ohio). Mr. Weibley, of the Pittsburgh Taximeter Co., has very well covered the ground in regard to uniformity of requirement, so it is useless for me to say anything on that; but I should like to say something in regard to the inspection of meters as conducted in our factory. First, however, I would like to have it distinctly understood that these meters are not being used in any attempt to cheat the public or the man or woman who rides in a cab.

Our tests in the factory are very severe. Our meters are first tested in our assembly department at a speed of 1,200 miles an hour.

The reason for this is that certain defects will show up at a high rate of speed, whereas they would not show up at a lower rate of speed—35 to 40 miles an hour, for instance. After a cabinet is placed on the meters they go to the real inspection in the testing department, where they are tested at a rate of 400 miles an hour for the same reason. The first part of the test is primarily to test the device which is designed to prevent tampering with the record on the inside; the second part of the test is for dead mileage; and the third is to make sure that the drums are working properly and do not hang up in the wrong position. Then, there is a run for the testing of a device consisting of a series of wheels inside the meter which prints on our printed record, which is for the benefit of the cab company. The meter is then run through a stock time test of 10 minutes. When this record is removed and checked, the mileage must figure correctly with the money charges shown, and I can assure you that it does. I can show you records of any number of our tests that figured absolutely accurate, and if there is any variation, it is very slight; over a distance of 3 or 4 miles it is negligible.

I do not think I have anything further to say, except that we want to cooperate with this bureau in every way that we possibly can. You realize what we, as manufacturers, are up against in the way of not having some standard specifications throughout the country. The fact that different specifications are required in various parts of the country makes it rather difficult for us, and we will appreciate anything done by the Bureau of Standards toward the standardization of taximeter requirements.

The Acting Chairman. Are there any other representatives of taximeter companies present who desire to talk on this subject? [After a pause.] If not, we will pass on to the next item on the program, "General consideration of subjects of interest brought up for discussion by delegates." If any of the delegates desire to bring up any questions that have not been under discussion so far, the time is right for it now.

Mr. Prior. I think it would be well at this time to bring to the attention of the conference the fact that we have with us one of the men who was, I think, one of the originators of this conference, Doctor Reichmann.

Doctor Reichmann. I appreciate being called upon by Mr. Prior, but I have nothing to say. I thank you.

(It was moved and seconded at this point that the conference adjourn, the question was taken, and the motion was agreed to.)

(Thereupon, at 4 o'clock p. m., the conference adjourned to meet at 9.30 o'clock a. m. Thursday, May 29, 1924.)

SEVENTH SESSION (MORNING OF THURSDAY, MAY 29, 1924)

The conference reassembled at 10 o'clock a. m., at the Bureau of Standards, William B. McGrady, first vice-president, in the chair.

STATEMENT IN RELATION TO TOLERANCES FOR BREAD LOAVES

The Acting Chairman. The first number on the program will be the report of the committee on specifications and tolerances on tolerances for bread loaves.

Mr. Holbrook. The program calls for a report of the committee on specifications and tolerances on this subject. At the time the program was prepared it was hoped that a report could be brought in at this conference, but on account of legal difficulties arising on account of the construction of the Supreme Court decision in the Nebraska bread case it was decided not to attempt to bring in such a report until more mature consideration could be given the matter. Suggestions were made in the papers at the Tuesday morning session, and the committee will direct its efforts to the end that a proper report may be prepared having regard for the Supreme Court decision. The committee is prepared to substitute in lieu of the report on bread the report which was placed in your hands yesterday.

REPORT OF COMMITTEE ON SPECIFICATIONS AND TOLERANCES ON CHANGES IN CERTAIN SPECIFICATIONS, AND EXPLANATIONS THEREON, PRESENTED BY F. S. HOLBROOK, CHAIRMAN.

Your committee on specifications and tolerances has been in session for some days and has been giving consideration to the various specifications and tolerances adopted from time to time by this conference and now in force and effect and recommended by this conference. This consideration has to some extent taken the form of a general review of the various codes.

In general, as a result of this review of these specifications and tolerances of the conference, your committee on specifications and tolerances is of the opinion that by certain rearrangement and reclassification of the material the specifications and tolerances may be made more readily understandable than is at present the case, and in this way a greater degree of uniformity of interpretation and enforcement throughout the various jurisdictions may be secured. On this account your committee proposes that it be authorized to proceed to make such rearrangement and reclassification without changing the meaning or effect of the present specifications and tolerances.

Further, in reviewing the present specifications and tolerances your committee has come to the conclusion that certain amendments should be made in some of them. In some cases your committee is now ready to present specific amendments, which, in its opinion, should be made, and these changes are set out in detail below. Your

committee is especially anxious to have the authority mentioned above granted and to have the amendments recommended given consideration at this time, since it has been advised by the Bureau of Standards that it may be found possible to issue a revised edition of Handbook No. 1 during the year. In this case it is very advisable that the specifications and tolerances be in the best possible form, so that the Handbook may not become obsolete shortly after it is printed.

In presenting these changes for your consideration there will, from time to time, be interpolated into the formal report explanatory matter detailing the reasons for the individual changes proposed.

LINEAR MEASURES

Specification No. 1, under the heading "Linear measures," reads as follows:

1. Measures of length shall be made of a material the form and dimensions of which remain reasonably permanent under normal conditions—for example, steel, brass, hardwood, etc.: Provided, however, That tapes for commercial purposes may be made of cloth, but only when this is wire-woven, and when by this means an actual and sufficient reinforcement and permanency is obtained.

The committee recommends that this specification be amended by striking out that portion of the specification beginning with the words "Provided, however, * * *" to the end of the specification.

When this specification was first adopted, it was considered that tapes which were actually wire-woven might be developed, so that they would be satisfactory for commercial purposes. This expectation has not been fulfilled, however, and it is our opinion that the so-called "reinforced" tapes can not be considered satisfactory for commercial uses. The proviso is confusing, inasmuch as it seems to suggest that such tapes are procurable, and therefore we recommend that it be stricken out.

GLASS GRADUATES

Specification No. 7, under the heading "Glass graduates," reads as follows:

7. The graduation marks shall be varied in length in such a manner that they may be conveniently read, *but in no case shall any graduation mark extend less than one-fourth of the distance around the graduate. The main graduation marks shall extend at least one-half of the distance around the graduate: Provided, however, That on duplex, or double-scale, graduates a clear space shall be left between the ends of the main graduation marks on the two scales, and this space, measured parallel to the graduation marks, shall conform to the following values:*

Circumference of graduate at the graduation marks	Distance between ends of graduation marks
	Inch
Up to 5 inches	1/8
From 5 to 10 inches, inclusive	1/4
More than 10 inches	3/8

It is proposed to amend this specification largely because it is not sufficiently specific in that "main graduation marks" are not defined. It is specified that they are to be of a certain character, but it is not clear as to what graduation marks are to be considered main graduation marks. In one of the States a manufacturer submitted some unsatisfactory graduates, and their approval or rejection depended upon the interpretation of these words. Therefore, the following specification is presented to include definitions:

7. Main graduation marks are those indicating the principal subdivisions into which a graduate is divided, the value of which should readily be ascertainable in order to facilitate the reading of the graduate at any point on its scale. *All main graduation marks shall extend around the same proportional part of the circumference of the graduate. All graduation marks of this character shall be construed to be main graduation marks. These graduations shall extend at least one-half of the distance around the graduate: Provided, however, That on duplex, or double-scale, graduates a clear space shall be left between the ends of the main graduation marks on the two scales, and this space, measured parallel to the graduation marks, shall conform to the following values:*

Circumference of graduate at the graduation marks	Distance between ends of graduation marks
	Inch
Up to 5 inches	1/8
From 5 to 10 inches, inclusive	1/4
More than 10 inches	3/8

Intermediate graduation marks are those which extend around a smaller proportional part of the circumference of the graduate than do the main graduation marks, and when these are employed the graduations shall be varied in length in such a manner that the scale may be conveniently read, *but in no case shall any graduation mark extend less than one-fourth of the distance around the graduate.*

MILK BOTTLES

The section in relation to tolerances for milk bottles reads as follows:

TOLERANCES.—The tolerances to be allowed in excess or deficiency on individual bottles, and on the average capacity of bottles, shall not be greater than the values shown in the following table. The error on the average capacity of bottles shall be determined by finding the error on each of not less than 25 bottles selected at random from at least four times the number tested and taking the algebraic mean of these errors.

NOTE.—To find the algebraic mean of a number of errors, first add all those errors which are in excess; then add all those errors which are in deficiency; then subtract the smaller sum from the larger; and finally divide this result by the total number of bottles tested.

Capacity of bottle	Tolerance on individual bottles		Tolerance on average capacity	
	Drams	Cubic inches	Drams	Cubic inches
2 quarts	6	1.4	1.5	0.35
3 pints	5	1.2	1.25	.29
1 quart	4	.9	1.0	.23
1 pint	3	.7	.75	.17
½ pint	2	.5	.5	.12
1 gill	2	.5	.5	.12

It will be noted that tolerances on individual bottles and on the average content of bottles are specified, but no explanation is included as to how these tolerances are to be applied. It is clear, perhaps, that no bottle is to be allowed to be in error by an amount greater than the tolerance given for individual bottles, regardless of the number tested, and that the average content of 25 or more bottles should not be in error by more than the tolerances provided in that case; but it is not clear what procedure is to be followed when individual bottle tolerances are complied with, but the average capacity does not so comply, especially when the average test is applied to bottles already in use. In the case of a new shipment of bottles, if a representative number are taken at random, tested, and averaged, and it is found that this average does not conform with the tolerance on average capacity, then the new shipment will doubtless be rejected as a whole. In that case the tolerance on average capacity works out all right. But suppose we go to a bottling station and test 25, 50, or 100 bottles taken at random from those in use and find that they do not have the proper average capacity—then what is to be done? It seems that it is inequitable as well as impracticable to require that the whole stock of bottles of that dealer be rejected on account of the fact that a number tested did not comply with the average tolerance specified. At the same time it is not proper to allow all bottles to be continued in use merely because they comply with the individual tolerances, since these were purposely made liberal on the theory that errors on individual bottles would not be of so much consequence if they were not all in the same direction. The proposed mode of procedure under the circumstances outlined is that, in the case of bottles in use, if these do not comply with the tolerances of both characters previously mentioned, then each individual bottle may be considered as a liquid measure and may be accepted or rejected according as to whether or not it complies with the tolerance for the liquid measure of the appropriate size. This latter tolerance is somewhat smaller than that specified for individual milk bottles. To sum up, it is proposed that if bottles in use comply with the individual tolerances on bottles, but do not comply with the tolerance on average capacity, then liquid measure tolerances shall take effect in respect to such bottles.

The values for the tolerances on individual bottles and on average capacity remain unchanged. In accordance with the above, the new section on tolerances proposed, is as follows:

TOLERANCES.—The tolerances to be allowed in excess or deficiency on bottles to be used in the sale of milk or cream shall be as follows:

1. When a test comprises less than 25 bottles of the same capacity and ownership, the tolerances shall be those given in Table A below:

2. When a test comprises 25 or more bottles of the same capacity and ownership, the tolerances shall be applied not only to the individual bottles, but also to the average capacity of at least 25 such bottles, these to be taken at random when the whole supply available is not tested. The error of any individual bottle among those tested shall not exceed the values shown in Table A below. The average error on the bottles tested shall not exceed the values shown in Table B below: Provided, however, That in the case of bottles already in use, if the average error is greater than that above specified, then, if desired, all of the bottles of the particular size and ownership in question may be treated as individual measures, in which case all of these

bottles shall be separately tested, and the tolerances shown in Table C below shall be applied.

NOTE.—To find the average error on a number of bottles, first add all those errors which are in excess; then add all those errors which are in deficiency; then subtract the smaller sum from the larger; and finally divide this result by the total number of bottles tested.

Capacity of bottle	Table A: Tolerance on individual bottles		Table B: Tolerance on average capacity		Table C: Special tolerance for individual bottles already in use			
					In excess		In deficiency	
	Drams	Cubic inches	Drams	Cubic inches	Drams	Cubic inches	Drams	Cubic inches
2 quarts	6	1.4	1.5	0.35	6	1.4	3	0.7
3 pints	5	1.2	1.25	.29	5	1.2	2.5	.6
1 quart	4	.9	1.0	.23	4	.9	2	.5
1 pint	3	.7	.75	.17	3	.7	1.5	.3
½ pint	2	.5	.5	.12	2	.5	1.0	.2
1 gill	2	.5	.5	.12	2	.5	1.0	.2

SCALES—GENERAL SPECIFICATIONS

Specification No. 5, under the heading "Scales—general specifications," reads as follows:

5. All knife-edges shall be of hardened and tempered steel. They shall be sharp and bear throughout the entire length of the parts designed to be in contact.

The proposed change is a purely formal one designed to eliminate a present inconsistency in the specifications. This general specification does not recognize agate as a material suitable for knife-edges, although such material is specifically allowed in the case of prescription scales by the specifications therefor.

It is therefore recommended that this specification be amended to read as follows:

5. All knife-edges shall be of hardened and tempered steel, except that agate may be used for special classes of scales when specifically permitted by the specifications therefor. They shall be sharp and bear throughout the entire length of the parts designed to be in contact.

Specification No. 8, under the same heading, reads as follows:

8. If a scale has a nose-iron, the position of this at the time of installation of the scale shall be clearly and accurately indicated.

By the terms of this specification the position of the nose-iron is required to be indicated as of the time of installation of the scale. It appears that it would be very preferable if this position were to be indicated at the time that the levers are sealed at the factory. Then, if any displacement occurs while the scale is in the course of shipment or while it is being installed, this fact will be apparent and the indication of the proper position will be of great assistance in the adjustment of the scale that will be necessary.

It is, therefore, recommended that this specification be amended to read as follows:

8. If a scale has a nose-iron, the proper position of this as determined by the factory sealing operation shall be clearly, accurately, and permanently indicated.

APPLICATION OF TOLERANCES TO RAILROAD TRACK SCALES

The next recommendation of the committee is as follows: Following the words "not closer together than the distance between," strike out the words "extreme positions which the truck can assume on opposite ends of the shortest span" and insert in lieu thereof the words "similar points on adjacent spans."

This amendment is recommended in order that this paragraph may be in conformity with the recommendations and practice of the Bureau of Standards in its railroad track-scale work, this method of computing track-scale errors having been adopted by the bureau some time ago after a careful investigation of the matter.

SPRING SCALES

Specification No. 6, under the heading "Spring scales," reads as follows:

6. The indicator shall be firmly attached and reach to the graduated divisions.

By the terms of this specification, which is repeated in substance under other headings, it is required that indicators must reach to the graduation lines. A method of construction has been called to our attention which is not technically in compliance with this requirement, but which seems to be a proper one and one susceptible of giving good results. In this construction two elements in the same plane are employed—a graduated scale and an indicator. If the separation of the ends of the graduations and of the end of the indicator is small, such an arrangement should be a satisfactory indicating device.

Therefore, it is recommended that this specification be amended to read as follows:

6. The indicator shall be firmly attached and reach to the graduated divisions, or if the construction is such that the indicator and reading face are in the same plane, then there shall not be a separation of the ends of the graduation lines and the end of the indicator of more than 0.04 inch, this distance to be measured along the line of the graduations.

If adopted here, this change should also be made in similar specifications under separate headings.

COMPUTING SCALES

Specifications Nos. 5 and 6, under the heading "Computing scales," read as follows:

5. All computing scales shall be equipped with weight indicators on both the dealers' and customers' sides, and their width shall not exceed 0.015 inch. The distance between the chart and the weight indicators shall in no case exceed 0.06 inch. Both indicators shall reach to the graduated divisions and shall indicate clearly and correctly.

6. All computing scales shall be equipped with a value indicator on the dealers' side, and its width shall not exceed 0.015 inch. The distance between the chart and the value indicator shall in no case exceed 0.06 inch. This indicator shall reach to each value graduation and shall indicate clearly and correctly.

The question has arisen whether the language of these specifications is such as to prohibit an auxiliary indicator at a greater distance

from the chart, such auxiliary indicator not being designed to function of itself as an indicator of weight or value, but intended to make it possible for each of various observers easily to bring his eye to the proper position from which the indications of the scale should be read. While it is felt that the present specifications probably do not clearly prohibit this construction, nevertheless if it is desired to allow it, this fact should be made plain, and at the same time the construction should be safeguarded in so far as possible, so that the device will not be confusing to the operator.

It is therefore recommended that the specifications above be amended to read as follows:

5.[1] All computing scales shall be equipped with weight indicators on both the dealers' and customers' sides, and with a value indicator on the dealers' side, and the width of such indicators shall not exceed 0.015 inch. The distance between the chart and the weight and the value indicators shall in no case exceed 0.06 inch: Provided, however, That this shall not be construed to prohibit the employment of an additional indicator at a greater distance from the chart, designed and constructed so as to facilitate the correct positioning of the eye of the observer properly to read the indications of the scale and reduce parallax, when such additional indicator is clearly differentiated from the weight or the value indicator, so that it will not be mistaken therefor.

6. Each indicator shall reach to each graduation of the graduated scale in conjunction with which it is designed to be used; or if the construction is such that the indicator and graduated scale are in the same plane, then there shall not be a separation of the ends of the graduations and the end of the indicator of more than 0.04 inch, this distance to be measured along the line of the graduations.

If these amendments are made, similar specifications under other headings should be amended to conform therewith.

CREAM-TEST AND BUTTER-FAT-TEST SCALES

The next recommendation of the committee is that under the heading "Cream-test and butter-fat-test scales" there be added a new specification to be known as specification 5a and to read as follows:

5a. All scales shall be so designed and constructed that when an 18-gram weight is shifted to any position on the scale platform normally occupied by a cream-test bottle or to any position on the scale platform in which the 18-gram weight may reasonably be placed when samples are being weighed, the additional resulting error in the weight indication, due to this cause alone, shall not exceed 1 grain.

At the present time no specification for a shift test on cream-test and butter-fat-test scales is included. We believe that a shift test on these scales is essential, and that the one described above is proper and reasonable for this class of scales.

WEIGHTS

The next recommendation of the committee is that under the heading "Weights—Tolerances" there be added the following section at end of present sections.

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[1] It was necessary to incorporate two amendments in these specifications, namely, the one just mentioned above, and the one in regard to an indicating scale and indicator in the same plane, made to a specification under the heading "Spring scales," but necessary to be included here to make these sections conform with similar requirements given under other headings. In order to facilitate the incorporation of these two amendments, the material contained in the two specifications has been rearranged, since presentation to the conference, in such a way that each amendment need be stated only once. This action is in accordance with the authorization of the committee by the conference to make such rearrangements when desirable.

TOLERANCES.—The tolerance to be allowed in excess or deficiency on weights to be used in connection with the cream-test and butter-fat-test scales and moisture-test scales shall be 20 milligrams on the 18-gram weight and 10 milligrams on the 9-gram and 10-gram weights: Provided, however, That the manufacturers' tolerances or the tolerances to be allowed on new weights shall be one-half the values given.

No tolerance values are provided for weights of this class at present. Moreover, none of our present tolerances are believed to be applicable. The tolerances recommended above have now been in force and effect in one or two States for a number of years. It is believed that these weights should not be in error by more than the amounts specified if proper accuracy is to be obtained in the Babcock test. We are advised that manufacturers have no difficulty in producing weights in conformance with these tolerances.

LIQUID-MEASURING DEVICES

Specification No. 21, under the heading, "Liquid-measuring devices," reads as follows:

21. DIVERSION OF MEASURED LIQUID.—All liquid-measuring devices shall be so designed and constructed that no portion of the measured liquid can be diverted from the one discharge outlet through which delivery is being made or to be made during the operation of the liquid-measuring device.

This specification is to be construed to require that there shall be no means provided by which any of the measured liquid can be diverted from the measuring chamber or the discharge line to the supply tank or elsewhere, during the period of operation, and that all valves in the supply line intended to prevent the reversal of flow of the liquid shall be of such design and construction that their closure is automatically effected in the use of the device. Also, when two or more discharge outlets for the liquid are provided all outlets except the one in use must automatically be tightly and completely closed off during the period of discharge, and the closure shall be so effected that delivery made through one discharge outlet shall not affect the subsequent delivery through any other discharge outlet: Provided, however, That the above shall not apply to the drain outlet from the filtering chamber when such outlet is in plain view of the customer.

This specification, as its title indicates, deals at the present time with the prohibition of the diversion of measured liquid and requires that this object shall be secured in one way only; that is, by the automatic closing off of all outlets except the one in use. The committee believes that this specification might well be broadened in two ways: First, by requiring a construction that will not only prevent any diversion of measured liquid but will assure an observant customer that full delivery of all measured liquid is taking place; and second, by eliminating the requirement of a specific method of construction and allowing any construction that will serve to accomplish the end sought.

In the opinion of the committee this object can be accomplished by amending the specification to read as follows:

21. ASSURANCE OF COMPLETE DELIVERY.—All liquid-measuring devices shall be so designed and constructed as to furnish assurance that all measured liquid which is apparently being delivered from that delivery outlet which is being employed in any particular operation of the liquid-measuring device, is actually being delivered so long as there is any liquid passing through this delivery outlet.

This specification is to be construed to require that all valves in the supply line intended to prevent the reversal of flow of the liquid shall be of such design and construction that their closure is automatically effected in the

use of the device, and that when two or more delivery outlets for the liquid are provided a delivery made through one delivery outlet shall not affect the subsequent delivery through any other delivery outlet. It is further to be construed that either (1) there shall be no means provided by which any of the measured liquid can be diverted from the measuring chamber or the discharge line to the supply tank or elsewhere during the period that liquid is flowing from the delivery outlet apparently in sole use; or (2) if there be any means whatever by which an incomplete delivery or any diversion of measured liquid can be accomplished or made, then the device must be so designed and constructed that such fact will automatically become an immediately obvious one to anyone observing the operation of the device.

Respectfully submitted.

(Signed) F. S. Holbrook, *Chairman.*
Wm. F. Cluett,
Wm. B. McGrady,
Committee on Specifications and Tolerances.

Mr. Holbrook. It will be noted that this report is signed by all members of the committee who are present at this conference. We might add that we have reason to believe that R. F. Barron and Chas. M. Fuller, the members who are not present, are also in sympathy with these recommendations.

DISCUSSION OF ABOVE REPORT

The Acting Chairman. Gentlemen, having heard this report read and the recommendations of the committee briefly explained, the chair would like to know your pleasure, whether you wish to take these up section by section for your approval, or otherwise. We would like to hear any remarks from any of the delegates present on this.

Mr. Foster. Mr. Chairman, I think this has been thoroughly gone over by the committee which has brought it before this body. I move that the report be adopted as submitted.

(The motion was seconded.)

The Acting Chairman. Are there any questions or remarks?

Mr. Egy. Mr. Chairman, there is just one section that I would like to discuss, and that is regarding the tolerances on weights to be used in connection with cream-test and butter-fat-test scales and moisture-test scales. It is suggested that 10 milligrams be allowed on the 9-gram and 10-gram weights and 20 milligrams on the 18-gram weight. The class C weights used by the sealers are such that errors on the individual weights which may be used in making up the total may add up to that much. Take the sealer's class C weights and add the tolerances allowed on the 5, 2, and 2-gram weights, which might be used to test a 9-gram weight, and the total allowance on these would be 11 milligrams. This value would be greater than the tolerance allowed on the weight to be tested. How will the inspector test a 9-gram weight when his own weights may possibly have a greater error than that allowed here?

Mr. Holbrook. The committee has considered that question. It has always been considered that the possible errors allowable on the standard should not be more than about one-fifth of the permitted error of the weight under test, since otherwise too much of the tolerance on the weight under test might be absorbed by the errors in the standards used. We might be continually rejecting

weights under test, not necessarily because they were in error by more than the tolerance, but on account of the errors present in the standards. It resolves itself down to this: We need greater accuracy on these classes of commercial weights; therefore class C weights will not be satisfactory for the test of cream-test and butter-fat-test weights. It is the proposal of the committee, and the Bureau of Standards has agreed to this, that notice be sent to the manufacturers that when weights to be used in the testing of cream-test and butter-fat-test weights are supplied standard weights should be furnished which are within the tolerances allowed on class B standards, even though in details of construction the standards comply only with class C. That is not an entirely new proposal, because already the tolerances on prescription scales are so small that weights in error by the values of class C tolerance are not satisfactory. This matter is covered in Handbook No. 1, which specifies that in testing such scales the standard weights employed should not be in error by an amount greater than the tolerance for class B standards.

Mr. Egy. That takes care of the matter. I wanted to bring it to the attention of the officials. It has been our practice to make weights just a little better than required, and we do furnish class C weights which are really within class B tolerances.

(The question was taken and the motion was agreed to.)

ADDRESS BY THE SECRETARY OF COMMERCE, HON. HERBERT HOOVER

Gentlemen, I am very glad to have the pleasure of again welcoming this conference at the Bureau of Standards. The work which you have done during the time I have had the responsibility of this department has been one of the most constructive performances that we have participated in. I feel that it goes much further than, perhaps, is apparent on the surface because by degrees, with your cooperation and largely at your initiative, we are gradually developing a scientific service in fixed standards throughout the country.

The original purpose of your offices and work, of course, was limited to the inspection of standards of weights and measures as a matter of the public's protection against fraud. Herein lies a very great principle which has only begun to be recognized in its wider vision throughout our entire commercial fabric. That is the great principle that it is impossible even to establish ethical practices or standards of conduct without a definition of the standards themselves. There is no way by which right or wrong can be maintained in the vast processes of trade and exchange unless there are precise standards, and, with the development of science and the enormous development of industry, with the production of thousands of commodities of different dimensions, purposes, and quality, we must determine some accurate bases before we can have a determination of the vital principle of right and wrong.

The problem enormously expanded through the development of the sciences and their application. We are now faced with the difficulty of determining quantities in the use of gas, electricity, water, and a hundred other things. We are faced with the difficulty of

determining standards of quality and the proper standards of dimension in a thousand different commodities.

Your particular offices in the States, limited originally, have in many instances been expanded in order to take account of this enormous development in service and industry. Some of you already have the problems of testing meters of various kinds. Sooner or later you will be confronted with the problems of determining standards of quality. Somebody has yet to determine standards in fuel for the protection of the public, and so we go, first in one field and then in another. To succeed in this work a more definitely organized background must be developed.

I should like to see the time come, a thing which we can not expect overnight, but it should be in our plans, when our commissioners of weights and measures shall be not solely inspectors of minor questions of weights and articles for measuring volume, but when they shall have behind them a trained scientific staff and a certain amount of laboratory development in connection for better organization of their work.

I do not see how we are to deal with the thousand complex problems which are thrust upon us, with variations in a thousand directions on commodities, both as to standards of quality and standards of size, unless we are to have that scientific background of training and equipment. You, no doubt, have discussed these questions often enough. I feel somewhat amateurish in coming before you with matters in which you are more familiar than I. The Bureau of Standards has established this great purpose for the Nation as a whole. It has developed the appreciation of the complete necessity that standards should be backed by scientific research and trained men. The time has come when our States and municipalities need more men scientifically trained and backed by institutions similar to, although no doubt less in size than, the Bureau of Standards.

This contribution must be made by the States if we are to maintain a determination of what is morally right and wrong. It is nonsense to say that the ten commandments are sufficient when you are distributing electrical current, for instance. It must be measured and somebody must determine the unit of measure and see that it is used. That is the eleventh commandment. In this vast number of transactions that go on amongst our people there is involved the question of the maintenance of the public morals, which can not be solved unless there is some precision of definitions.

Now, it would seem to me worthy of development in these meetings of yours that some constructive plan might be propounded so that services of this character could be put on a more stable, a more scientific basis. They should be taken out entirely from the realm of politics because precision and science do not breathe in that field.

There is one thing that appeals to me to-day and that is that no centralized body among 105,000,000 of people can satisfactorily serve their purpose; that as our population grows the necessity for the maintenance of State responsibility and community responsibility also grows. There is even less justification of centralization of the Government to-day than there might have been 100 years ago, so

the development of these ideas within each State and within each community is a worthy problem for this conference, and I offer it to you for further suggestions and further development. Thank you.

REPORT OF COMMITTEE ON RESOLUTIONS, PRESENTED BY A. W. SCHWARTZ, CHAIRMAN

The first resolution is as follows:

RESOLUTION OF APPRECIATION TO THE SECRETARY OF COMMERCE

Whereas the honorable Secretary of Commerce, Herbert Hoover, has always had the deepest interest in the affairs pertaining to weights and measures, so much so that, though recovering from a siege of illness, he has made special effort to address the delegates here in conference assembled: Therefore be it

Resolved, That the conference express its thanks and sincere appreciation to Secretary Hoover for his helpful address and wish for him complete restoration to good health.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION OF APPRECIATION TO THE DIRECTOR AND STAFF OF THE BUREAU OF STANDARDS

Whereas the gratifying success that has marked this Seventeenth Annual Conference of Weights and Measures Officials of the United States has been mainly due to the able and untiring efforts of Director George K. Burgess and his assistants from the Bureau of Standards; and

Whereas the valuable information, instruction, and encouragement received by the weights and measures officials here assembled has been of such nature as to spur them on in the performance of the duties and requirements of their several offices; and

Whereas these annual conferences bring the various State, county, and municipal departments of weights and measures more closely together and demonstrate the value of the cooperation given by the Bureau of Standards: Therefore be it

Resolved, That this conference go on record in extending to Director Burgess and his able assistants its appreciation and thanks for their valuable services so kindly and generously given.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION OF APPRECIATION TO MESSRS. F. S. HOLBROOK, RALPH W. SMITH, AND L. V. JUDSON

Whereas Messrs. F. S. Holbrook, Ralph W. Smith, and L. V. Judson, of the Bureau of Standards, so ably and instructively presented to this conference the several papers on the timely subjects assigned to them on the program of the conference: Therefore be it

Resolved, That the thanks of the delegates here assembled be extended to these gentlemen for the valuable information and instruction which the members received from the excellent papers submitted.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION OF APPRECIATION TO MESSRS. WILLIAM SMEDLEY, J. B. HORIGAN, H. E. BARNARD, AND M. L. ERNST

Whereas William Smedley, of the Retail Merchants' Association of Pennsylvania; J. B. Horigan, attorney, office of the Solicitor, United States Depart-

ment of Agriculture; Dr. H. E. Barnard, director, American Institute of Baking; and Morris L. Ernst, of the Jewelers' Board of Trade, New York City, kindly prepared and read papers on timely and interesting subjects to the conference: Therefore be it

Resolved, That the delegates in conference assembled do hereby extend to each of them sincere thanks for the excellent addresses given.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION OF APPRECIATION TO HON. CHARLES BRAND

Whereas the Hon. Charles Brand, Member of Congress from the seventh district, Ohio, and author of the Brand Federal bread bill now before Congress, so eloquently, impressively, and convincingly presented to the delegates the crying necessity for standard-weight bread legislation: Therefore be it

Resolved, That the thanks of the conference be expressed to the Hon. Charles Brand for the exhaustive, instructive, and highly interesting address delivered by him in support of his arguments for this much-needed regulation.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION IN REGARD TO TESTING OF POST-OFFICE SCALES

Whereas this Seventeenth Annual Conference on Weights and Measures of the United States has received a request from Hon. Harry S. New, Postmaster General of the United States, that it give consideration to and express its attitude upon the advisability of its members, in their capacity as weights and measures officials, undertaking the testing of post-office scales throughout the United States: Therefore be it

Resolved, That this conference goes on record as being heartily in favor of this proposal and desires hereby to tender to the United States Post Office Department its full cooperation in any plans which may be matured in order to accomplish the desired end.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION INDORSING UNIFORMITY OF REGULATIONS FOR MILK AND CREAM BOTTLES

Whereas the existing regulations affecting bottles used for the sale of milk and cream in the United States, are not uniform among the several States, particularly in respect to the point to which bottles shall be filled in order to hold their correct capacity and in respect to marking requirements; and

Whereas this divergence of regulations serves no useful purpose, but only complicates the enforcement of bottle requirements throughout the country and needlessly hampers the manufacturers of bottles in the making and marketing of their product: Therefore be it

Resolved, That we, the delegates to the Seventeenth Annual Conference on Weights and Measures go on record as favoring the adoption of uniform regulations for milk and cream bottles by all of the States and cities; and be it further

Resolved, That the national Bureau of Standards be requested to draw up a code of regulations based upon those adopted by the Eleventh Annual Conference on Weights and Measures and including uniform designating numbers to identify the bottles of each manufacturer; and be it further

Resolved, That this conference does hereby recommend to and urge upon each State and municipality the adoption of this uniform code.

(The resolution was duly adopted.)

Mr. SCHWARTZ. The next resolution is as follows:

RESOLUTION IN MEMORY OF J. FRANK FOWLER, PAUL E. CARROLL, AND CHARLES W. WOOLEY

Whereas it has been the will of Divine Providence to take from our midst J. Frank Fowler, assistant State superintendent of weights and measures of New Jersey; Paul E. Carroll, superintendent of weights and measures of Cape May County, N. J.; and Charles W. Wooley, sealer of weights and measures of Boston, Mass., faithful members of the annual conference; and

Whereas the sterling principles and untiring efforts of these officials in advancing the cause of honest weights and measures at all times recommended them highly to our esteem: Therefore be it

Resolved, That we, the members of the Seventeenth Annual Conference on Weights and Measures, assembled at Washington, D. C., this 29th day of May, 1924, take official notice of the passing of these associates into the great beyond by spreading this resolution in full upon the minutes of this conference, to stand as our memorial to them.

Mr. SCHWARTZ. I move the adoption of this resolution and suggest that in adopting it we do so by rising and standing in silence for one minute.

The ACTING CHAIRMAN. All those in favor of this resolution will please give their assent by rising in their places and standing in silence for one minute.

(The resolution was unanimously adopted in the manner suggested.)

FLOWERS IN MEMORY OF LOUIS A. FISCHER

Mr. CLUETT. Mr. Chairman, I would like to make a motion at this time that the secretary be instructed to place flowers on the grave of our late secretary, Mr. Louis A. Fischer.

(The motion was seconded, the question was taken, and the motion was agreed to.)

Mr. SCHWARTZ. Mr. Chairman, I would like to present the treasurer's report.

REPORT OF TREASURER, J. HARRY FOLEY

Gentlemen: I herewith submit my report as treasurer for the year ending May 26, 1924:

Receipts:		
Balance on hand last report		$168.75
Received through fees of delegates		98.00
Total receipts		266.75
Disbursements:		
May 24, 1923, to Edward W. Garrett	$5.00	
July 3, 1923, to F. S. Holbrook, secretary, for expenses incidental to Sixteenth Annual Conference	129.08	
Total disbursements		134.08
Balance on hand May 26, 1924		132.67

Respectfully submitted.

J. HARRY FOLEY, *Treasurer.*

The ACTING CHAIRMAN. Gentlemen, you have heard the report of the treasurer.

(A motion was made and seconded that the report of the treasurer be accepted, the question was taken, and the motion was agreed to.)

REPORT OF COMMITTEE ON NOMINATIONS, PRESENTED BY WILLIAM F. CLUETT, CHAIRMAN, AND ELECTION OF OFFICERS

Mr. Chairman, your committee on nominations respectfully recommends the following members of the conference to act as officers and members of the executive committee for the ensuing year:

President, George K. Burgess; first vice president, I. L. Miller; second vice president, Thomas F. Egan; secretary, F. S. Holbrook; treasurer, George F. Austin; members of the executive committee, all of the officers ex officio, R. F. Barron, Fred Benjamin, W. F. Cluett, J. H. Foley, William Foster, A. H. Gibert, jr., J. J. Holwell, W. B. McGrady, Arthur McWilliams, Francis Meredith, G. B. Nebinger, Lawrence Paul, W. A. Payne, G. M. Roberts, E. J. Saldaña, A. W. Schwartz, W. F. Steinel, L. P. Strong, George Warner, and H. A. Webster.

(Signed) W. F. Cluett, *Chairman.*
L. P. Strong,
T. F. Egan,
W. B. McGrady,
Wm. Foster,
Committee on Nominations.

(A motion was made and seconded that the secretary be instructed to cast the ballot of the conference for all of these nominations; the question was taken, and the motion was agreed to.)

(Accordingly, the secretary cast the ballot of the conference for the officers and members of the executive committee, as nominated by the committee on nominations, and they were declared duly elected.)

FRAUDULENT MARKING OF JEWELRY

By Morris L. Ernst, *Representing Jewelers' Board of Trade, New York, N. Y.*

The unfortunate part of this subject is that it is so new. Of course, jewelry is considered by people generally throughout the country to be a luxury, and our legislators and inspectors have, therefore, had very little concern in regard to the proper marking and stamping of jewelry, but there are one or two unique features in connection with jewelry in commerce. In the first place, not all these articles are luxuries—a watch, tableware, and even a wedding ring are not considered luxuries. Second, jewelry has a real value, and although in order to determine whether an article of jewelry has been properly marked you must destroy the article, in spite of the destruction you have left a residue which consists of gold, silver, platinum, or something of value.

The custom of marking jewelry is different in this country from the custom prevailing in England or Europe. In England the old practice of marking is still in use; there the Government takes the responsibility for the carat and sterling mark. In this country we allow manufacturers to mark their mechandise according to what they determine the standard to be. At the same time we have passed legislation in several States defining certain agreed-upon standards for marking jewelry.

There is a certain type of legislation of which the Federal law passed 17 or 18 years ago is a good example, which has been absolutely useless and ineffective. This provides that an article marked with a carat mark must assay up to the carat mark within a certain tolerance; in other words, a 10-carat article must contain 10 parts out of the 24 parts of the article of pure gold, with a certain leeway or tolerance which is allowed. There has never been a single conviction under this character of law; there has been only one indictment, and that was quashed. This was due to the fact that the word "knowingly" was inserted in the penalty section. That means that in order to convict you must prove that the person who sells the improperly marked article knows that the mark is irregular—you must get evidence to this effect—and this is practically impossible. In more recent State laws on the subject the word "knowingly" is being left out, with good results. In New York State, for instance, the bureau of weights and measures of the city of New York has been obtaining anywhere from 25 to 40 convictions a year for the fraudulent stamping, branding, and selling of jewelry.

Another method of approach which we have used in connection with the misbranding of jewelry is through the Federal Trade Commission. You will find on their docket 25 to 50 cases regarding the use of such terms as "filled," "gold filled," and the many other terms now used to cloud the issue when the consumer purchases jewelry.

There is a great need for certain standards in connection with the jewelry trade, and in the endeavor to establish these and to check certain abuses which have arisen in their absence, the bureau of weights and measures of the city of New York and the Federal Trade Commission have been at work, their efforts having been directed particularly against the misuse of the "carat" and "sterling" marks. As a result we have obtained convictions, but as soon as we get a conviction declaring a term in use fraudulent a new term is invented which is thought to be within the law and by means of which it is hoped to deceive the public. For instance, there is a legitimate article of commerce known as "gold-filled" jewelry. That means that the inside piece or core of a piece of jewelry so marked is of inferior base metal, while on the outside is a bit of gold. Jewelry so constructed was sold for years under the term "gold filled." It is a reasonably fair definition of what the article is, and there is no representation as to the quantity or quality of the gold. The next move was that various manufacturers started to mark such articles as "14 carat," or "14-carat gold filled." That suggested that the article was fourteen twenty-fourths pure gold. The courts of New York said that was irregular; that if a man wanted to mark an article "14-carat gold filled" he must show the percentage of the article that was "14-carat gold." Therefore, we now find jewelry marked "1/10 14-carat gold filled," for instance, giving the public the opportunity to know that one-tenth is gold and that that one-tenth is 14-carat gold.

We have thousands of gold emblem buttons throughout the United States, and these are often marked "gold top." The great question arises, not only from the point of view of the buyer, but of the law, "What is the top?" Is it the entire top piece if there are two

pieces fastened together? Where is the back? The same question arises in connection with breastpins and brooches marked "gold front" and "platinum front." What does that mean? No one can tell where the front begins and the back ends.

The jewelry association contends that it is a basic principle in marking merchandise that there should not be two marks on an article unless it is composed of two separable pieces which are separated in ordinary use; in which case if such parts are composed of materials of different fineness, each part should be properly marked. For instance here [indicating] is a pencil commonly used in the United States. It is made of separable parts. The jewelry association has said that the man should not mark this pencil "14 carat" and sell it to the trade when only this small part [indicating the top] is 14 carat and the rest is a thin plate.

We also have great difficulty with the term "solid gold." What does it mean? Does it refer to the solidity of the article or the quality of the gold? There are only two States that give an answer. Pennsylvania and Connecticut have legislated to the effect that in order to be marked "solid gold" the article must be 10-carat or better. I do not know whether this is a wise solution or not. In this connection the jewelry association is agreed that an article made of 10-carat gold should not be marked "solid gold" unless it is also marked to indicate the amount of gold in the article.

Candlesticks are being made with the whole exterior, even the bottom, covered with a coating of sterling silver, but with the interior composed of pitch, cement, lead, or steel. Since this interior is nowhere exposed to view, the consumer consequently has no knowledge in this case that the inside is of other material than sterling silver. The bureau of weights and measures in New York City has secured a conviction in our courts in a case where a man sold a candlestick as sterling silver that was filled with a base metal. The court decided that all the parts that appeared or purported to be sterling must be sterling, and that unless the consumer has an opportunity to see base metal or other material within he can assume that the whole of the article is of the degree of fineness marked on the outside. Sterling silver is defined as silver assaying 925/1,000 pure silver.

There is, however, a legitimate economic reason for not making candlesticks entirely of sterling silver, for if they were so to be made they would be beyond the reach of most people. It is sufficient, from an economic standpoint, to have the outside of sterling silver and to have this supported by some kind of reinforcing on the inside, whether steel, lead, cement, pitch, or anything else. However, unless the weight of silver is specified, it follows that you may have two candlesticks, both looking alike, of the same size and weight, and competing on an equal basis, one of which may be composed of 10 per cent pure silver and 90 per cent reinforcing material, while the other may be composed of 90 per cent pure silver and 10 per cent reinforcing material. Consequently the only solution seems to be that in addition to the mark "sterling silver" on the article there should be a mark denoting the quantity in ounces of the silver in the article.

I have given these few illustrations to indicate some of the problems with which the jewelry industry is confronted. The greatest problem in the jewelry industry in recent years, however, is that which has developed in connection with the increased demand for the use of platinum in jewelry. You must remember that years ago, when platinum sold for $10 an ounce, it was not a very popular metal; then nobody wanted it; but as soon as the price went to $100 an ounce every woman wanted platinum jewelry.

The manufacturing jeweler's ingenuity led him to take gold and color it so that it looked like platinum. As a result we now have throughout the world the material known as white gold. This material being available, there grew up the practice of combining in one article of jewelry white gold and platinum, and now you will find that the bulk of the jewelry sold, purporting to be and appearing to you or anyone to be platinum, is made partly of platinum and partly of white gold. What is the proper method of marking such a piece of jewelry made of platinum and white gold? There are only two States—Illinois and New York—that have laws on this point, these defining and declaring that when an article is marked "platinum" the term means that there is a minimum of 925/1,000ths of the element platinum in the article.

Now, what happens is this: The manufacturer makes a ring out of white gold. But it is a fact that for the purpose of inserting stones, diamonds and the like, in the ring platinum can be used to advantage, as it is a harder metal and better working than gold. So the jeweler employs some platinum in this ring. Therefore we find him using $14 white gold for 60 per cent of the ring and $150 platinum for the remainder. But now, on account of the use of platinum, he wants to mark the ring "platinum 18-carat." The jewelers' association says that this is an improper mark, because no one knows how much platinum is there or how much white gold. The jewelers then suggest: "Suppose we mark it 'platinum front,' 'platinum top,' or 'platinum face'"? Then you have the same problem as that I mentioned before in relation to gold; you do not know whether there is a very small amount of platinum used or a substantial piece applied on the white gold. The only reasonable conclusion at which we can arrive is that unless the article is made of two separable parts, so that one part can be marked "18-carat white gold" and the other "platinum," the word "platinum" should not appear on the article. They have not as yet tested the laws of New York or Illinois in relation to platinum, which I have mentioned, because the jewelers insist that it is unfair for them to be put at a disadvantage, or at least to be prevented from making jewelry which dealers in every other State are at liberty to sell.

Without the governmental agencies, such as the bureau of weights and measures of New York, I doubt if the jewelers' association could have done anything more than pass resolutions and try to exhort its members to raise the standards of the industry; but with the cooperation we receive from this city agency, purchases are being made constantly by a representative of the bureau in conjunction with the representatives of the jewelers' association. The articles are taken to the United States assay office for assay. The judges in our jurisdiction are educated to the point where they ask hardly

any questions regarding the assay brought in from the United States assay office, and the defendants seldom attempt to contest these assays. The result of all this is that we are building up a body of public opinion in this relation, and the intricacies of these scientific and mechanical matters are coming to be better understood both by the judges and the public.

I dare say we are progressing in this connection in many ways. In the old days there is no doubt but that a man frequently dared to lie about what he was selling. What a man says to-day must be the truth, and I hope we are about to enter into the stage where, when a man says something, he must say it all. That seems to be the problem. Should we say part of the truth without saying it all? Isn't it the duty of a man who marks a candlestick "sterling" to say there are 4 ounces or 6 ounces of silver in it, as the case may be? If a man makes a cigarette case and it appears to be made of gold and silver, should he not mark it to show how much of it is gold and how much silver?

There is just one other suggestion I would like to leave with you. It seems to me that there are agencies in the States and cities that can adequately cope with these problems. Moreover, it seems to me that most of the corrective influences which have come about in connection with the marking of articles of commerce have not come by the convicting of one or two unscrupulous merchants, but by actually getting the industries themselves, through their legally constituted trade associations, to take a part in the work, to spread the gospel, to try to prove to all the merchants of the industry that if all are competing on the same basis of marks and standards no one will be hurt. In this connection I doubt if the Federal Trade Commission will ever develop very fully in connection with their function of raising the standards of the industry by proper marking and preventing unfair competition, unless it finds it out what the associations are in each industry and which associations are vitally concerned in any matter under investigation. It should have such information at its finger tips, so that it could at any time communicate with these associations and cooperate with them in developing what are the honest practices in the trade. In other words, it should develop definite operating contact with the trade associations of the country. Thank you.

DISCUSSION OF ABOVE PAPER

Mr. Maroney. Mr. Chairman, I understand that the jewelry trade has had several different sizes of carat weights. Some eight or nine years ago, due to the difference in the size of the carat weights used throughout the world, there was adopted and there is now in use what is known as an international metric carat weighing 200 milligrams. This is a simple proposition; but if instead of giving the weight of a stone in carats and fractions of the carat they gave the actual weight in milligrams, it would simplify it still more. Why would it not be simpler to do away with the word "carat" altogether?

Mr. Ernst. Mr. Chairman, I never considered it. I have heard in the trade that the name "carat" has represented different

weights, but to switch over to the term "milligram" would require a long process of education. People have used the term so long that they would be slow to change.

Mr. Maroney. If you go to a jeweler he may show you a diamond and state, "This is a half carat and a sixty-fourth." How can the customer know what he is talking about? But if the weight were to be given as so many milligrams, the customer can figure what the actual size of the stone is.

ARRANGEMENT OF SESSIONS OF EIGHTEENTH ANNUAL CONFERENCE

Mr. Holwell. Mr. Chairman, the next question which we should take up is whether we are going to have afternoon sessions at coming conferences. We have had a difference of opinion in the executive committee regarding the advisability of having these afternoon sessions. Personally, I feel that if we can get the work started at 9 o'clock and work hard until 1 o'clock, there would be sufficient labor performed each day to justify our trip to Washington, but I would like to have the opinion of my associates here as to how they feel in the matter.

The Acting Chairman. We would like to hear from the delegates on this question. We put it this year on a 50–50 basis; but if it is possible to get here promptly at 9 o'clock and then work on to 1 o'clock and adjourn for the afternoon, perhaps we could accomplish just as much as if we tried to run both a morning and an afternoon session. It is agreeable to me either way.

Mr. Cluett. I think we ought to look at this matter from the viewpoint of the delegates coming from a long distance. There are many delegates coming to these conferences whose expenses range from $150 to $500. When the bureau or the officials of this conference send out invitations to the governors or the boards of county commissioners or the mayors, as the case may be, and send along with those invitations a tentative program which only outlines a session for the morning, the "powers that be" will look at it from the viewpoint of whether it is worth while to spend the money to send a delegate for possibly a three-hour session per day. I feel that they will consider it as a junket and turn the proposition down. I know, speaking for myself, that we have had a hard time in Chicago to convince them that it is worth while to send a delegate, even when it amounts to what it does now, and there are delegates whose expenses are three times as much as ours. For that reason I am in favor of the two-session day.

The Acting Chairman. Several years ago I was an earnest advocate of the one-session day in Pennsylvania. I found it worked out fine there. On coming here to Washington and taking it up with delegates from distant points, I was of a different mind concerning this conference. State conferences can be held, and held very successfully, with one session a day, running from 9 to 1.30. Every moment should be occupied by business, and after that social features can be included. I can readily see, however, as Mr. Cluett points out, that if one comes from the far West or from down South the "powers that be" may look upon a conference consisting of one session a day as a junket trip.

Mr. Maroney. I believe we should have sessions both in the morning and the afternoon.

Mr. Egan. I believe we should have two sessions a day. I think that the papers read and the discussions that are held are very valuable. We can not afford to set up a program that will invite criticism to the effect that we are only in session for a couple of hours in the forenoon. If, perchance, the business on any one day is such that we can dispose of the program early and there is nothing else we can do we can take an adjournment until the next day.

Mr. Holwell. Mr. Chairman, I think we have the consensus of opinion. To remove from the shoulders of the executive committee the necessity of passing on this subject before the next conference, I move you, sir, that at the Eighteenth Annual Conference on Weights and Measures to be held in 1925 we hold two sessions a day.

(The motion was seconded, the question was taken, and the motion was agreed to.)

MANUFACTURERS' EXHIBIT AT FUTURE CONFERENCES

Mr. Maroney. The average man who comes here comes for education, so that he can return to his jurisdiction better fitted as a public servant. Formerly at these conferences the manufacturers had a number of exhibits, and these were educational. To my surprise and disappointment I found there was no such exhibit this year. If the manufacturers would bring their apparatus here and have a field and construction man go through it from a mechanical standpoint, I think each one of us would be better equipped when we return to serve the municipalities that we left, and, in other words, be better servants. In the future I hope the manufacturers will bring their apparatus here and let their field-service men instruct us.

Mr. Holbrook. In regard to manufacturers' exhibits, I might say that recently there have been fewer manufacturers exhibiting at the conference each year. Last year the amount of apparatus exhibited was so small that criticism was made by some of the manufacturers exhibiting that the exhibit was not sufficiently successful to justify them in continuing to exhibit their products. Early during the present year we circularized the manufacturers to determine their attitude in the matter. Some few appeared to be anxious to exhibit; a few additional advised that they would exhibit if especially requested, but were not particularly interested; the majority did not care to exhibit their apparatus under any circumstances. As a result, it appeared to be demonstrated that a manufacturers' exhibit at this conference, if held, would be but little, if any, better than the one which was criticized last year. It was decided, therefore, to drop the exhibit from the program of this year and allow it to develop what stand should be taken in the future on that question. Some manufacturers have suggested that if the exhibit were to be dropped for a year or two it was perfectly possible that they might find it to their advantage at a later time to request that the exhibit again be held.

The manufacturers were advised that while we had always been interested in having them exhibit, we did not consider that this feature was essential to the success of the conference, and I think

it has been demonstrated during the present session that this is the case.

Many of the manufacturers have said that the weights and measures officials were so familiar with their ordinary and usual types of weighing and measuring apparatus that it seemed futile to have them on display down here; that the weights and measures officials were accustomed every day to seeing them in the stores which they visited. Looking into the future, it is possible that we might some time be able to hold an exhibit of this character: We might strictly limit it to include only apparatus which had been developed very recently and which was not well known to the weights and measures officials. If it were suggested that only certain apparatus would be acceptable, I think the reaction would be such that the manufacturers would be very anxious to have their apparatus accepted. Also, if only new and unusual types of apparatus were shown these would be of interest to almost everybody here, and they would be very anxious to see them. The exhibit then would not be neglected. If such an exhibit were small enough it might be arranged close at hand—for instance, in the back of the room here—where it would be accessible to all delegates at all times. A large exhibit is necessarily placed in some other building, there not being available space in this one. That idea is something that might be developed in the future.

The Acting Chairman. It has been stated that some manufacturers believe that the weights and measures officials are fully conversant with all their products, and it is only a waste of time to bring them here. I would differ from that view. I think the exhibit is very helpful. Do any manufacturers care to discuss this subject? If not, is there any new business to be brought before the conference? [After a pause.] Well, gentlemen, we have wound up a very successful conference and a motion to adjourn is in order.

Mr. Foster. I move we adjourn.

(The motion was seconded, the question was taken, and the motion was agreed to.)

(Thereupon, at 11.55 o'clock a. m., the Seventeenth Annual Conference on the Weights and Measures of the United States adjourned sine die.)

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